Prepared for:
Mason County Community Development and Utilities

MASON COUNTY, WASHINGTON

Belfair/Lower Hood Canal Water Reclamation Facilities Plan Supplemental Information

DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

NOVEMBER 2006

MASON COUNTY
DEPARTMENT OF COMMUNITY DEVELOPMENT

Planning
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November 9, 2006

Dear Interested Party:

Mason County is preparing supplemental information to amend the Belfair/Lower Hood Canal Water Reclamation Facilities Plan (Belfair Facilities Plan), which was last amended on April 15, 2004. The supplemental information provides for wastewater collection and centralized treatment in the Belfair urban growth area (UGA) and part of a possible Limited Area of More Intense Rural Development (LAMIRD) in the adjoining North Shore area. The proposed amendment to the Belfair Facilities Plan includes a review of treatment alternatives for the Belfair service area. Adoption of the proposed amendment would be accomplished by amending the Mason County Comprehensive Plan. Similarly, the LAMIRD would be designated by amending the Comprehensive Plan.

This Programmatic Environmental Impact Statement (EIS) has been prepared to provide information to the Mason County Board of Commissioners as they decide whether to approve the Belfair Facilities Plan amendment and to designate the LAMIRD via Comprehensive Plan amendments.

This EIS covers the general impacts associated with collection, treatment and reclamation of wastewater as described in the proposed amended Belfair Facilities Plan. The EIS has been prepared in accordance with the State Environmental Policy Act (SEPA). Consistent with the Washington Administrative Code (WAC 197-11-060 (5)), Mason County as lead agency is conducting this evaluation as a phased environmental review. This broad programmatic review will be followed by a more narrow focused environmental evaluation after a preferred program has been selected.

A 30 day comment period is provided for review of the document, ending December 11, 2006. Comments received will be used to revise the document, and a Final Programmatic EIS will be issued. The Final EIS, and other information of record, will be used as the basis for making a final decision on the proposal. Action on the proposal may be taken as early as the end of January 2007.

Sincerely,

Emmett Dobey
Responsible Official
Director, Mason County Community Development and Utilities

FACT SHEET

PROJECT TITLE

Belfair/Lower Hood Canal Water Reclamation Facilities Plan Supplemental Information

PROJECT DESCRIPTION

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This EIS focuses on the environmental impacts associated with three alternatives:

- Alternative 1 represents construction of a collection system to serve the core commercial area in the Belfair UGA, and a new water reclamation facility near Belfair using Membrane Biological Reactor (MBR) treatment methodology. The reclaimed water produced by the facility would be land applied.

- Alternative 2 represents construction of a collection system to serve the core commercial area in the Belfair UGA, and the expansion of the existing North Bay/Case Inlet (NB/CI) water reclamation facility. To accommodate flows originating from the Belfair area, the existing NB/CI service area would require the installation of additional secondary treatment capacity at the site. The reclaimed water produced at the NB/CI facility would be land applied.

- Alternative 3 represents the No Action Alternative. Under this alternative, wastewater collection and centralized treatment would not be provided, and wastewater management would remain unchanged from current conditions.

The Programmatic EIS also reviews impacts associated with designating a LAMIRD in the Mason County Comprehensive Plan for parts of the North Shore area as part of Alternatives 1 and 2. The purpose of this designation would be to allow very limited centralized wastewater treatment service for existing North Shore developments that have likely contributed to the declaration of a severe public health hazard in Lynch Cove and increasingly severe hypoxia in lower Hood Canal. No LAMIRD would be designated associated with Alternative 3.

PROJECT LOCATION

The project is located in the Belfair area of Mason County. The affected areas include the Belfair UGA, and a portion of the existing developed area in unincorporated Mason County on the north shore of Lynch Cove.

PROPONENT

Mason County Community Development and Utilities

LEAD AGENCY

Mason County Community Development and Utilities

RESPONSIBLE OFFICIAL

Emmett Dobey
Director, Mason County Community Development and Utilities

CONTACT PERSON

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Mason County
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(360) 275-4467
steveg@co.mason.wa.us

PERMITS AND LICENSES REQUIRED

Potential permits/approvals for the project may include, but would not be limited to:

Federal:

Section 404 Permit (Nationwide 12)

State:

National Pollutant Discharge Elimination System
Waste Discharge Permit – Reclaimed Water
Order of Approval to Construct New Air Pollution Source (Notice of Construction)
Forest Practices Permit
Section 401 Water Quality Certification

Local:

Conditional Use/Special Use Permit
Zoning Code Variance
Building/Grading Permits and Drainage Review
Comprehensive Plan Amendment for designation of a Limited Area of More Intense Rural Development (LAMIRD)
On-going coordination with the Skokomish and Squaxin Island Tribes

AUTHORS AND PRINCIPAL CONTRIBUTORS

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DATE OF DRAFT EIS ISSUE

November 9, 2006

DUE DATE FOR COMMENTS ON THE DRAFT EIS

Written comments to the lead agency (Mason County) on this Draft Programmatic EIS must be submitted by **December 11, 2006**, to the following address: Mason County, Attn: Steve Goins, Planning Manager, P.O. Box 279, Shelton, WA 98584. Comments may also be emailed to Steve Goins at steveg@co.mason.wa.us.

For more information, please contact Steve Goins, (360) 427-9670 ext. 577 or steveg@co.mason.wa.us.

DATE OF PUBLIC MEETING/PUBLIC HEARING

There will be a **public meeting** in Belfair on **Wednesday, November 15, 2006** from 6:00 p.m. to 8:00 p.m. at the North Mason School District Administration Office Board Room. This meeting will be conducted in a workshop setting, providing an opportunity for questions and answers about the Draft Facilities Plan Supplemental Information and the Draft Programmatic EIS.

There will be a **public hearing** on the Draft EIS held on **Tuesday, November 28, 2006** at the North Mason School District Administration Office Board Room from 6:00 p.m. to 8:00 p.m. This will be a formal public hearing, and all comments will be recorded for inclusion in the Final EIS.

FUTURE ENVIRONMENTAL REVIEW

Site-specific environmental review will be conducted for the selected alternative in accordance with SEPA requirements. No additional analysis of the Belfair Facilities Plan amendment or plan alternatives is anticipated beyond this document. Project-specific environmental evaluations will be identified to meet SEPA requirements. The form of these evaluations will depend upon the nature of the specific project and funding opportunities, but will likely be an environmental checklist, an addendum, or a supplement to this EIS.

PURCHASE OF COPIES

Copies of the EIS are available for public review at the locations listed below, or are available online at www.co.mason.wa.us.

Mason County Planning Dept.
411 N 5th Street
Shelton, Washington 98584

Mason County Belfair Annex
23910 NE State Route 3
Belfair, Washington 98528

North Mason Timberland Library
NE 23081 State Route 3
Belfair, Washington 98528

Copies of the EIS may be purchased for the duplication cost of $33.50 per copy. Copies on CD ROM are available for the reproduction cost of $2. To order printed copies or CD ROMs, contact Steve Goins at 360-427-9670 ext. 577.

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CHAPTER 1.0 SUMMARY

1.1 Introduction

Mason County is preparing supplemental information to amend the Belfair/Lower Hood Canal Water Reclamation Facilities Plan (Belfair Facilities Plan), which was last amended on April 15, 2004. The currently proposed amendment provides for wastewater collection and centralized treatment serving the Belfair urban growth area (UGA) and a possible Limited Area of More Intense Rural Development (LAMIRD) in the adjoining North Shore area. The proposed amendment to the Belfair Facilities Plan includes a review of treatment alternatives for the Belfair service area.

This amendment follows a significant amount of previous study and evaluation within the Belfair area. A draft Facilities Plan for the Belfair/Lower Hood Canal study area was prepared in 1997, and from December 1997 through June 1999 it was considered by the Belfair/Hood Canal Sewer Facilities Advisory Committee. The process continued until mid 2001, when a final Facilities Plan was submitted to the Washington State Department of Ecology (Ecology). This Facilities Plan was approved by Ecology in 2002, but Mason County decided additional analysis was needed. An amended Facilities Plan was prepared in 2003 and was last amended in 2004.

The Washington Department of Community Trade and Economic Development is currently providing funding to construct a sewer facility for Belfair. The 2005 legislature appropriated $16 million for Mason County to construct a sewer system in Belfair. The 2006 legislature reduced the amount by $4.8 million to fund other priority projects in Puget Sound.

This Programmatic Environmental Impact Statement (EIS) covers the general impacts associated with collection and treatment of wastewater as described in the proposed amended Belfair Facilities Plan. It focuses on the environmental impacts associated with three alternatives:

- Alternative 1, a collection system in the commercial core area of the Belfair UGA, a centralized water reclamation facility near Belfair, and land application of reclaimed water;
- Alternative 2, a collection system in the commercial core area of the Belfair UGA, expansion of the North Bay/Case Inlet (NB/CI) reclamation facility, and land application of reclaimed water; and
- Alternative 3, the No Action Alternative.

This EIS is intended to evaluate the impacts of providing wastewater treatment to accommodate development projected as part of Mason County's comprehensive land use planning process. It is not the purpose of this evaluation to revisit previous land use decisions. Environmental impacts associated with the proposed land use designations were previously evaluated in the *Supplemental EIS for the Proposed Urban Growth Area Plan and Development Regulations* (Mason County, 2004).

1.2 Project Alternatives

Alternative 1 represents construction of a new water reclamation facility near Belfair using Membrane Biological Reactor (MBR) technology as the secondary treatment methodology. The reclaimed water produced by the facility would be land applied. Alternative 2 represents the expansion of the existing NB/CI water reclamation facility. To accommodate flows originating from the Belfair area and the existing NB/CI service area, the NB/CI water reclamation facility would require expansion of the secondary treatment process. The reclaimed water produced at the NB/CI reclamation facility would be land applied. Alternative 3 represents the No Action Alternative. Under this alternative, wastewater collection and centralized treatment would not be provided, and wastewater management would remain unchanged from current conditions.

The Programmatic EIS also reviews impacts associated with designating a LAMIRD for parts of the North Shore area by amending the Mason County Comprehensive Plan. The purpose of this designation would be to allow very limited centralized wastewater treatment service for existing North Shore developments that have likely contributed to the declaration of a severe public health hazard in Lynch Cove.

1.3 Summary of Scoping

A public information meeting was held on October 11, 2006, at Theler Center in Belfair to provide information and receive oral comments on the scope of the EIS. An estimated 55 people attended the meeting. Written comments on the document were accepted by the lead agency (Mason County) until October 25, 2006. In addition to the verbal comments received at the public meeting, four written comment letters were received by Mason County. Provided below is a summary of the comments and questions received on the scope of the EIS.

General Comments and Questions

- The South Shore area needs to be included in the service area.
- Cost.
- Why was planning started with the North Shore area?
- Secondary impacts will occur in the North Shore area.
- The (north shore) pipeline will impact wetlands.
- Belfair State Park put in a new treatment system, which has fixed the fecal coliform problem in Lynch Cove.
- Does the land application area for Belfair drain into Case Inlet? Case Inlet has water quality problems.
- The severe health hazard around Belfair State Park is no longer a problem. Water quality in Lynch Cove is good. How much can the sewer improve water quality? If there is no health hazard, then there is no need for sewers.
- Low fecal coliform data collected since 2002 can be correlated with low rainfall levels.

- Homes in the North Shore area were built in the 1970s and the sewage goes directly into Lynch Cove.
- Will this facility accommodate NASCAR?
- It is important to identify issues associated with stormwater runoff.
- WSDOT is concerned that the proposed Belfair Bypass will conflict with the location of the proposed sprayfield.
- How was the sprayfield site selected?
- Failing septic systems are not a source of nitrogen in Hood Canal.

LAMIRD Comments and Questions

- A number of septic systems have been constructed in fill, and when the soil gets saturated everything migrates to Hood Canal.
- Hood Canal needs to be evaluated holistically. Mason County is currently evaluating Mission Creek because of significant coliform problems.
- Mason County is doing testing along with the Hood Canal Salmon Enhancement Group.
- Low oxygen problems are worse along the South Shore. Hood Canal has a lot of problems and everyone should share the burden of cost to fix them.
- Community septic systems should be covered in the EIS.
- Everyone who is affected by the sewer system should be in the LAMIRD.
- The EIS needs a section describing all options available for wastewater solutions.
- Is the LAMIRD considered an expansion of the UGA? Is it intended to allow urban growth? Will septic systems be decommissioned?
- How much development will be allowed under the LAMIRD?
- How were the LAMIRD boundaries drawn?
- Native American and pre-statehood cultural sites are located in close proximity.
- Wetlands and critical areas are present along both sides of SR 300.
- High tides frequently cross SR 300.
- Private and community water wells are located in the LAMIRD area.
- Reexamine the health hazard declaration.
- Placement of sewer lines will bring unwarranted development pressure.

Belfair UGA Comments and Questions

- The main sewer lines located off the right-of-way: how do you intend to get individual connections from one side to the other? What happens to people on the opposite side of the road?
- Why wouldn't there be a gravity line?

- There are wetlands along SR 3 that the pipeline will need to avoid.
- Where is the location for the proposed treatment plant?
- The EIS should discuss inter-basin transfer of water from the Lynch Cove basin to the Case Inlet basin.
- The pipeline shown for the eastern part of the service area is in an area along the railroad tracks that doesn't have many houses now.
- Is the sewer system designed to handle 500 more homes?
- What happens in the event of a big rain storm? Where would the overflows occur?
- Potential for increased property values and development within UGA.
- UGA boundary does not protect Union River Valley.
- Native American and early settler cultural sites are a concern.
- Identify and protect critical areas and salmon-bearing streams.
- Protect wildlife habitat and bald eagle nesting areas.
- Aquifer depletion is a concern.
- How many private and community water wells are proposed in the service area?
- The service contains a Type II Critical Aquifer Recharge Area.
- Groundwater recharge area is impacted by more intense R-10 development.
- Lack of other urban services is a concern.
- A stormwater management plan is lacking.
- The proximity of the UGA to conservation areas is a concern.
- The area is economically depressed.
- Safety of construction timing in high accident corridors.
- Discuss changes in the rural character and quality of life.
- What is the financial impact to the school district?
- Discuss the population allocations allotment between Allyn and Belfair UGAs.
- The proposed pump station locations are near wetlands, Hood Canal, and a salmon-bearing stream.

To the extent possible, these questions and comments have been incorporated in the evaluations included in the Programmatic EIS. Some of the more detailed analyses will be incorporated into subsequent SEPA evaluations, when more project-specific details are available. Some questions with land use implications are dealt with in documentation concerning formation of the UGA.

1.4 Scope of this EIS

Mason County is conducting this phased review consistent with the Washington Administrative Code (WAC). The State Environmental Policy Act (SEPA), WAC 197-11-406, describes the appropriate timing for EIS preparation:

> "The lead agency shall commence preparation of the environmental impact statement as close as possible to the time the agency is developing or is presented with a proposal, so that preparation can be completed in time for the final statement to be included in appropriate recommendations or reports on the proposal (WAC 197-11-055). The statement shall be prepared early enough so it can serve practically as an important contribution to the decision making process and will not be used to rationalize or justify decisions already made. EISs may be "phased" in appropriate situations (WAC 197-11-060 (5))."

WAC 197-11-055(2) states that "the lead agency shall prepare its…environmental impact statement…at the earliest possible point in the planning and decision-making process, when the principal features of the proposal and its environmental impacts can be reasonably identified." In addition, WAC 197-11-060(5)(a) states that "Lead agencies shall determine the appropriate scope and level of detail of environmental review to coincide with meaningful points in their planning and decision making processes." WAC 197-11-060(5)(g) further states, "Any phased review shall be logical in relation to the design of the overall system or network…".

This EIS evaluates the major impacts associated with implementing alternatives to water reclamation for the Belfair UGA and the Comprehensive Plan amendments associated with the LAMIRD along the North Shore of Lynch Cove. The LAMIRD includes two phases, or zones. LAMIRD Zone A includes the existing high-density development in the North Shore area identified as having a high probability of contributing to water quality problems in Lynch Cove. LAMIRD Zone B, located at a greater distance from Lynch Cove, will be evaluated in the future, after implementation of LAMIRD Zone A, to determine if implementing sewer service in this area is warranted. Refer to Section 4.10 of this document for further discussion related to the LAMIRD.

This EIS acknowledges that additional site-specific SEPA evaluation will be conducted as part of reclamation facility, conveyance, and land application evaluations. Any additional or cumulative impacts associated with those facilities that have not currently been identified will be comprehensively discussed.

This EIS does not revisit previous land use decisions. Land use planning in Mason County has been conducted in accordance with SEPA requirements. This EIS evaluates the proposed wastewater facilities to ensure that wastewater treatment capacity is available to meet the needs within the Belfair UGA.

1.5 Summary of Major Impacts

Following is a brief summary of the major impacts associated with the alternatives, and potential mitigation measures. Additional detail is provided in subsequent sections of the EIS.

Table 1-1. Impacts Summary

Element of the Environment	Alternative 1	Alternative 2	No Action
Earth Resources	• Clearing and grading for construction of the facilities may result in erosion and sedimentation. • Construction in seismic hazard areas may be susceptible to liquefaction during earthquake events.	• Impacts would be largely the same as described for Alternative 1.	• Impacts to earth associated with the repair, replacement, and installation of individual on-site septic systems.
Air Resources	• Dust, and vehicle and construction equipment emissions during construction. • Potential odors related to wastewater system malfunction or operational inefficiencies. • Odor impacts are not expected to be noticeable under normal operating conditions; the reclamation facility is not located near any residences. • Pump stations represent the greatest potential to have perceptible odors on occasion.	• Impacts would be largely the same as described for Alternative 1.	• No impacts to air resources have been identified. • Any odors associated with currently failing or malfunctioning septic systems would continue and/or worsen in the future.
Surface Water Resources	• Slight potential for construction-related sediments to enter surface waters. • Reduction of nutrient and bacterial loading to Hood Canal from failing/malfunctioning on-site systems expected to be beneficial to both freshwater and marine water quality. • Potential to augment baseline stream flows in vicinity of land application site. • Increased development allowed by providing sewers could increase non-point loading to Hood Canal.	• Construction distances for the conveyance force main are longer, and have higher potential for construction-related sedimentation impacts to local surface waters. • Operational impacts are largely the same as those described for Alternative 1.	• Continued reliance on individual on-site sewage systems has the potential to result in increased contaminant discharges to surface waters from improperly functioning systems, and increased nitrogen loading from properly functioning systems. • Existing water quality trends expected to continue; as growth occurs water quality degradation could worsen.
Groundwater Resources	• Slight potential for construction-related impacts from potential dewatering. • Land application of highly treated reclaimed water would be applied at rates allowing uptake by vegetation; impacts to ground water not anticipated. • Nutrient and bacterial loading to ground water from failing septic systems would be reduced.	• Impacts would largely be the same as described for Alternative 1. • Greater dewatering volumes would result under this alternative associated with a longer force main.	• Continued reliance on individual on-site sewage systems could result in increased contaminant discharges to groundwater systems from improperly functioning systems.
Biological Resources, including fish and shellfish	• Loss of existing forested habitat at reclamation plant site. • Birds and larger mammals will move to adjacent habitat during construction. • Small mammals, amphibians, and reptiles may be lost during site clearing. • No impacts to fish resources anticipated from construction activities.	• Impacts are largely the same as described for Alternative 1.	• No construction-related impacts to biological resources would occur. • Current water quality trends would be expected to continue, potentially resulting in continued low dissolved oxygen concentrations

Element of the Environment	Alternative 1	Alternative 2	No Action
	• Fish habitat in Lynch Cove could benefit from reductions in nutrients anticipated to contribute to low dissolved oxygen levels. Additional study is needed to quantify the potential benefits of the project, but fish and shellfish habitat is expected to benefit from these reductions. • Recreational and commercial shellfishing could benefit from reduced bacterial inputs from on-site septic systems.		that are resulting in fish kills and degraded habitat for shellfish. • Commercial and recreational shellfishing could continue to be limited by high bacterial levels in areas served by on-site systems.
Noise	• Construction-related noise from vehicles, equipment, and associated activities, particularly during earthwork activities. • Low level vehicle and machinery noise during plant operation.	• Impacts would be largely the same as described for Alternative 1.	• Construction noise would occur from the replacement and installation of on-site septic systems.
Land Use	• Implementation of the sewer service within the Belfair UGA would allow growth to occur in accordance with the Mason County Comprehensive Plan. • Some level of increased development could occur within the LAMIRD, however, because this area is already developed to urban densities, most of this growth would be expected to be re-development. • Higher costs for sewer service may result in some individuals leaving the area.	• Impacts would be largely the same as those described for Alternative 1.	• Implementation of this alternative would result in inconsistencies with the existing Mason County Comprehensive Plan. • Growth would continue as allowed by on-site disposal regulations. This would result in lower densities, but may encourage developmental sprawl in the Belfair area.
Environmental Health	• Implementation of sewer service would reduce bacterial and other pathogenic inputs to Lynch Cove, reducing potential health risks from contact with poorly treated wastewater.	• Impacts would be the same as those described for Alternative 1.	• Continued inputs of poorly treated wastewater to the nearhore area of Lynch Cove could result in increasing public health risks.
Historic and Cultural Preservation	• Based on review of existing information, there is a low probability for archaeological resources or cultural resources in the general area of the reclamation site. Additional site-specific investigations would be needed to characterize potential impact.	• The increased length of the conveyance force main would result in a higher potential to encounter cultural or archeological resources. Site specific investigations will be needed to characterize the potential for this impact.	• No impacts to historical or cultural resources would be expected to occur.
Transportation	• Temporary increase in construction-related traffic on area roads. SR-3 and SR 300 most likely to be affected; congestion along these roadways would increase during construction. Some level of increased roadway congestion would be expected to occur on both major roadways and local streets for up to 15 months of the construction. • Proposed construction would need to be coordinated with plans by WSDOT for improvements to SR 3.	• Traffic impacts would be greater than those described for Alternative 1 because of the longer force main route. Roadway congestion along SR 3 could be significant.	• No construction-related impacts would occur.

Element of the Environment	Alternative 1	Alternative 2	No Action
	• Construction of the conveyance force main would result in delays along affected roadways. • Construction within the service areas would affect local two-lane roadways. • Small numbers of vehicle trips would occur during operation of the reclamation plant.		
Public Services and Utilities	• Potential for temporary disruptions of utility services may occur during construction. • Temporary disruptions to traffic flow could impede emergency service vehicles. • Increased fees for wastewater service may be a financial burden for local residents, particularly elderly or low income residents.	• Impacts would largely be the same as described for Alternative 1, except the potential for utility conflicts would be increased because of the longer conveyance line.	• Growth inside the Belfair UGA would be limited by existing wastewater treatment and sewer system capacity. • The area would continue to rely upon on-site wastewater disposal systems, with the potential for increasing failures or poorly functioning systems as these facilities age.

Table 1-2. Mitigation Measures Summary

Element of the Environment	Alternative 1	Alternative 2	No Action
Earth Resources	• Stringent erosion and sedimentation controls will be employed. • Implementation of construction BMPs. • Facilities will be designed in accordance with the International Building Code requirements.	• Mitigation would be the same as described for Alternative 1.	• Mitigation would be the same as described for Alternative 1.
Air Resources	• Construction dust and equipment will be minimized during construction. • Odor generating facilities would be located in areas where there are no receptors nearby. • If pump stations or other conveyance components can not be located at a distance from receptors, odor control measures would be implanted at the facility.	• Mitigation would be the same as described for Alternative 1.	• No impacts were identified; therefore, no mitigation measures have been developed.
Surface Water Resources	• Stringent erosion and sedimentation controls will be employed. • Construction will occur in accordance Mason County and Department of Ecology requirements. • The proposed MBR treatment technology represents state of the art treatment technology. • Highly treated reclaimed water will be land applied at a rate that will not result in runoff. • Effluent monitoring will be conducted in accordance with Ecology requirements. • Mason County will continue to work with other watershed managers to assess the effectiveness of existing water quality management techniques and to assess the need for additional efforts.	• Mitigation would be the same as described for Alternative 1.	• No impacts were identified; therefore, no specific mitigation measures have been developed. • Additional measures to control nutrient and bacterial contributions to Lynch Cove would need to be developed and implemented. All on-site systems would be constructed in accordance with recently revised Washington State Department of Health requirements.
Groundwater Resources	• Dewatering will be conducted to minimize impacts to ground water. • All ground water removed during construction will be properly disposed. • Ground water will be regularly monitored at the land application site to ensure that no impacts to ground water quality occur.	• Impacts are the same as those described for Alternative 1.	• No impacts were identified; therefore, no specific mitigation measures have been developed. • All on-site systems would be constructed in accordance with recently revised Washington State Department of Health requirements.
Biological Resources, including fish and shellfish	• The reclamation plant will be constructed to maintain an existing vegetated buffer around the site, to minimize impacts to wildlife and birds. • Reduction of nutrient and bacterial loading to Lynch Cove by implementing Alternative 1 is seen as a beneficial impact to fish and shellfish habitat. Ongoing monitoring and study will be needed to determine the extent of the potential benefit. • Strict adherence to stormwater management guidelines will be needed to ensure that inputs from stormwater and other non-point sources do not offset water quality improvements associated with wastewater treatment.	• Mitigation would be the same as described for Alternative 1.	• No mitigation measures have been developed. • Additional measures to reduce nutrient and bacterial loading to Lynch Cove would need to be developed.

Element of the Environment	Alternative 1	Alternative 2	No Action
Noise Resources	• Construction noise will be mitigated through proper maintenance of equipment, use of proper tools and attenuation barriers, and adherence to approved hours. • Noisy operations adjacent to residences or other receptors will be housed inside insulated structures.	• Mitigation would be the same as described for Alternative 1.	• No impacts were identified; therefore, no mitigation measures have been developed.
Land Use	• Compliance with development standards and associated permit conditions would mitigate the short-term and temporary construction impacts. • Mason County will enforce existing land use controls to limit development to those areas within the Belfair UGA and the LAMIRD that receive sewer service. Some of these limits are currently part of the County's regulations, but others, such as hook up requirements, lot size limitations, and other measures are not yet developed. Consistency with the RR-2.5 zoning within the LAMIRD will limit potential land use impacts. • Inconvenience to residences and businesses will be minimized. • Plant will be designed to be compatible with surrounding land uses; some structures will be placed below grade.	• Mitigation would be the same as described for Alternative 1.	• Urban growth would be restricted to low density land uses. • Limitations on development density in UGA to mitigate impacts of septic systems. • Increased management of on-site septic systems in rural area.
Environmental Health	• MBR treatment technology represents state of the art in treatment efficiency. • Reclaimed water would be applied at agronomic rates; there would be no runoff from the site. • Regular monitoring will be conducted to ensure that all applicable treatment standards are met. • All applicable standards for the storage and use of hazardous materials will be met. A spill containment and response program will be developed in accordance with applicable requirements.	• Mitigation would be the same as described for Alternative 1.	• On-site sewage systems should be designed, constructed, and maintained to minimize the potential for groundwater quality impacts. • Siting densities should be no greater than soil and groundwater conditions allow.
Historic and Cultural Preservation	• Coordinate with the Skokomish and Squaxin Tribes. • Coordinate with Tribes and professional archaeologist if resources are found.	• Mitigation would be the same as described for Alternative 1.	• No impacts identified; therefore, no mitigation measures have been developed.
Transportation	• In areas where construction would result in severe congestion, trenchless construction techniques such as microtunneling or directional drilling would be used to avoid surface disruption of streets. • Traffic control plans will be in place for affected areas and emergency service providers will be notified in advance of construction. • Minimize safety hazards during construction.	• Mitigation would be the same as described for Alternative 1.	• No impacts were identified; therefore, no mitigation measures have been developed.
Public Services and Utilities	• Coordinate with local utility and emergency service providers to minimize disruption. • Provide financial assistance for low-income residents to ease the financial burden of increased sewer rates.	• Mitigation would be the same as described for Alternative 1.	• Amend applicable city and county documents to redesignate urban lands to rural uses.

1.6 Areas of Controversy

Providing a centralized wastewater reclamation system to the Belfair area has been considered for many years and has always been controversial. Of paramount concern to local residents is the cost of sewer service, and how that cost will be equitably distributed. Some residents are concerned that the cost of paying for wastewater service will force them out of their homes. Others are concerned that the lack of centralized wastewater service is inconsistent with Mason County's adopted land use plan for the Belfair area, and continued delay in providing this service will have a negative impact on Belfair's overall economy. Another area of controversy relates to the potential for growth associated with providing wastewater service to a Rural Activity Center, and whether the indirect or secondary impacts associated with providing wastewater service will outweigh the beneficial effects on water quality.

Establishment of a LAMIRD on the North Shore has been a controversial topic at informational meetings about the proposed project. There is concern about how the boundary of the LAMIRD is drawn. A number of comments have been made, asking why the North Shore is included in the LAMIRD at this time, and the South Shore area is excluded. The North Shore area has been considered a priority because of the designation as a public health hazard in 2002, an existing level of developmental density that extends well beyond the shoreline area, and a concentration of aging septic systems. The South Shore area has lower development density, according to Mason County Assessor's data. While there are similar small waterfront lots along State Route 106, the South Shore does not have the same level of development in the upland areas that exists in the North Shore area. Residential developments in the South Shore area (along East Razor Road, Belfair Acreage Tracts, and in the Lakewood Community) do not reach the densities of the developments (such as Beards Cove and Lynch cove developments) in the proposed North Shore LAMIRD.

Questions have also been raised as to whether centralized wastewater treatment is being proposed to accommodate the proposed NASCAR track in nearby Kitsap County. As described above, the wastewater collection and treatment alternatives currently being proposed would only serve the Belfair UGA and the possible LAMIRD in the North Shore area. Wastewater service would not be provided to the proposed NASCAR track as part of this project.

These issues are discussed within the text of the EIS, and will continue to be discussed as the project moves forward.

1.7 Major Unresolved Issues

At this time, a major unresolved issue relates to funding and how much and in what ways the project cost will be borne by local residents. Existing state grants are anticipated to fund approximately $16 million of the anticipated costs; however, additional funding is required to fund the total project cost. If the initial ratepayers were to assume the project cost and no additional grants are received, the rates necessary using conventional revenue bonding would be unacceptable. If a Utility Local Improvement District (ULID) were formed to handle some or all of the capital cost of the initial project, the ULID repayment fees in combination with the utility operating rates would be extremely burdensome.

Consideration of funding approaches is underway. Additional grant funds will be sought, and final determinations about whether the project is feasible and its financing will be made prior to construction. These issues remain unresolved at this time.

1.8 Permits and Approvals

Potential permits for the project are listed below.

Federal:

Section 404 Permit (Nationwide 12)

State:

National Pollutant Discharge Elimination System
Waste Discharge Permit – Reclaimed Water
Order of Approval to Construct New Air Pollution Source (Notice of Construction)
Forest Practices Permit
Section 401 Water Quality Certification

Local:

Conditional Use/Special Use Permit
Zoning Code Variance
Building/Grading Permits and Drainage Review
Comprehensive Plan Amendment for LAMIRD

1.9 Documents Incorporated by Reference

Mason County Comprehensive Plan, Updated1995, including Environmental Impact Statement

CHAPTER 2.0 BACKGROUND

2.1 Existing Wastewater System

The North Bay/Case Inlet (NB/CI) water reclamation facility was constructed in 2001 to serve the Allyn area. Domestic wastewater is conveyed to the NB/CI facility through three pump stations. Currently, the Belfair UGA and North Shore/Lynch Cove area is served by on-site wastewater systems. Many of these systems are more than 20 years old, and would not meet current on-site wastewater system design regulations. There is one existing wastewater treatment facility currently serving the North Base Case Inlet area.

Wastewater flows into the reclamation facility and is piped into two sequencing batch reactor (SBR) tanks. Ultraviolet (UV) disinfection is used to provide effluent disinfection to meet Class A reclaimed water standards. Biosolids are removed from the facility and transported to BioCycle, Inc., near Shelton for further processing.

The North Bay/Case Inlet treatment plant is 5.5 miles from the Belfair UGA. Currently, all Belfair UGA wastewater is managed using on-site septic systems.

2.2 Purpose and Need for the Proposed Action

In Lower Hood Canal, water quality has deteriorated due to high levels of fecal coliform bacteria and increasing nutrient loading. The result has been closure of a portion of the shellfish harvesting areas, particularly Lynch Cove. The shellfish areas adjacent to Belfair State Park and Lynch Cove have been closed since 1990. By 1993, the Washington State Department of Health (DOH) enlarged the prohibited shellfish harvest area in Lynch Cove by about one-third. In addition, significant population growth in the Lower Hood Canal watershed was determined by the Department of Health to be a major contributing factor in these decertifications. Lower Hood Canal was listed on the Washington State Department of Ecology (Ecology) 303(d) list of impaired water bodies in 2004 for dissolved oxygen, fecal coliform, and pH.

Ecology has issued a consent order to Mason County requiring corrective action to protect public health and welfare and the environment within this affected watershed. In March 2002, the Department of Health declared part of Lynch Cove a severe public health hazard. In 2006, DOH recertified a portion of Belfair State Park for recreational shellfish harvesting following improvements to the on-site system at the Park. The severe public health hazard remains in effect at this time. Centralized wastewater collection and reclamation is being proposed to eliminate a number of failing on-site sewage systems, reduce the input of fecal coliform bacteria and nutrients into Lynch Cove, and protect water quality in Lower Hood Canal.

On August 14, 2006, the western Washington Growth Management Hearings Board issued a Final Decision and Order finding portions of Mason County's 2005 Comprehensive plan update out of compliance with the Growth Management Act (GMA) for failure to provide adequate planning and phasing of sewer service in the Belfair Urban Growth Area (UGA).

The community of Belfair is designated by Mason County as a UGA, and the North Shore LAMIRD has been proposed as a Rural Activity Center (RAC). To support the development of

the UGA and associated growth, adequate infrastructure including wastewater collection and centralized treatment, is required.

2.3 Project Planning

A Wastewater Facilities Plan was first prepared in 1997 and served as the basis for considering wastewater needs for the Belfair/Lower Hood Canal area. Between 1997 and 1999, the Belfair/Hood Canal Sewer Facilities Advisory Committee met, discussed alternatives, and provided final recommendations for planning wastewater facilities in the area. A Facilities Plan was prepared in July 2001 and submitted to Ecology. The Facilities Plan was approved by Ecology in March 2002. However, upon further review, Mason County requested additional analysis regarding a separate Belfair alternative or consolidating operations and facilities at the NB/CI facility. As a result, an amended Facilities Plan was prepared in December 2003 and April 2004. This EIS supports the Facilities Plan Supplemental Information (2006) that is being prepared related to the wastewater alternatives proposed for the Belfair service area.

2.4 Environmental Review Process

Mason County has prepared this Programmatic Environmental Impact Statement (EIS) for the proposed Belfair Facilities Plan amendment. The purpose of the amendment is to bring wastewater collection and centralized treatment to the Belfair UGA, and to provide for a possible Limited Area of More Intense Rural Development (LAMIRD) in the adjoining North Shore area. The purpose of this designation would be to allow very limited centralized wastewater treatment service for existing North Shore developments that have a high likelihood for contributing to the declaration of a severe public and environmental health hazard in Lynch Cove.

This Programmatic EIS covers the general impacts associated with collection and treatment of wastewater under three alternatives:

- Alternative 1, a centralized water reclamation facility near Belfair and land application of reclaimed water;
- Alternative 2, expansion of the NB/CI reclamation facility and land application of reclaimed water; and
- Alternative 3, the No Action Alternative.

The Programmatic EIS is being prepared to provide the Mason County Board of Commissioners with information to help them make decisions regarding approval of the Belfair Facilities Plan amendment and designation of the LAMIRD. Both of these decisions would be accomplished by amending the Mason County Comprehensive Plan.

2.5 Decisions to be Made

This programmatic EIS supports the following decisions of the Board of County Commissioners:

To amend the county Comprehensive Plan by:

- Amending the Belfair Wastewater Facilities Plan; and

- Establishing the North Shore LAMIRD.

2.6 Relationship to Other Plans and Policies

The Belfair/Lower Hood Canal Water Reclamation Facilities Plan was approved in July 2001 and amended in December 2003 and April 2004. Supplemental information for the amended Facilities Plan is being prepared and is anticipated to be complete in November 2006. This Programmatic EIS evaluates the recommended reclamation facility near Belfair as presented in the current Facilities Plan Supplemental Information (2006), as well as expansion of the NB/CI reclamation facility, similar to the preferred alternative described in the December 2003 Facilities Plan amendment.

CHAPTER 3.0 PROJECT DESCRIPTION AND ALTERNATIVES

3.1 Alternative 1 – Reclamation Facility near Belfair

Treatment Process and Reclamation Location

Alternative 1, the preferred alternative, represents construction of a new water reclamation facility near Belfair using Membrane Biological Reactor (MBR) technology as the secondary treatment methodology. The reclaimed water produced by the facility would be land applied. Refer to Figure 3-1 for locations of the proposed reclamation facility and land application area.

The water reclamation facility would be designed to accommodate the average daily flow of 0.40 million gallons per day (MGD) and a peak flow of 1.4 MGD. These are 10-year projected flows based upon the population projections in the Belfair Urban Growth Area (UGA) and existing connections in the North Shore area. Wastewater would be collected and piped to the reclamation facility where it would be treated to Class A reclaimed water standards. Disinfection at the facility would be provided by ultraviolet (UV) disinfection. In addition, a storage pond would be built to store up to 18.5 million gallons (MG) (46 days at average flow) of Class A reclaimed water in the event that weather conditions, such as extreme wet or cold, do not permit irrigation. Construction of the treatment plant and storage pond would take an estimated 15 months.

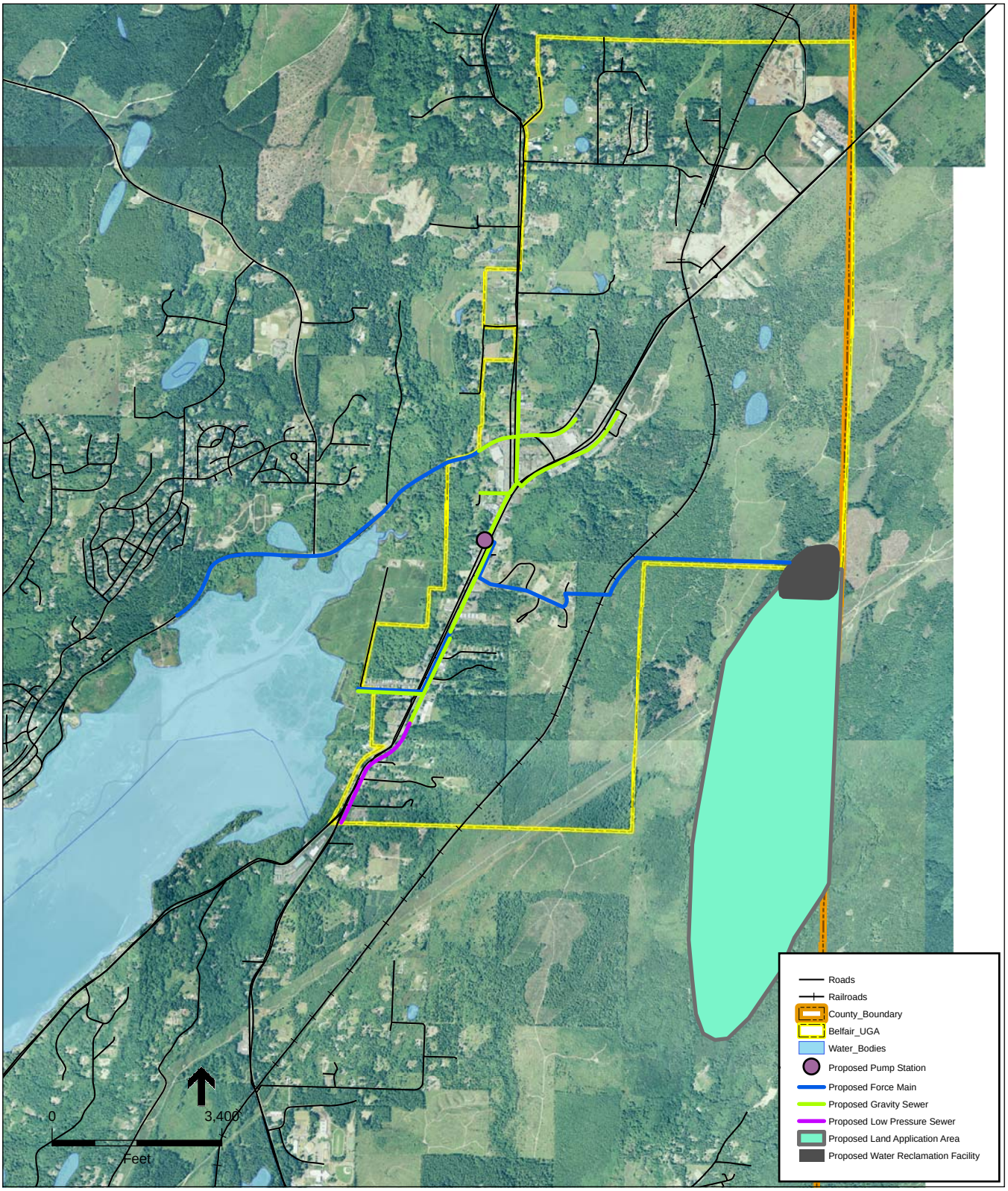
The reclaimed water produced by the facility would be land applied to a forested area approximately 33 acres in size (see Figure 3-1). The reclaimed water would be applied to one of three irrigation zones at a design rate of 1.83 inches per day. The irrigation system at the site would consist of a network of above-ground high-density polyethylene (HDPE) pipes and irrigation sprinklers to disperse the reclaimed water.

One pump station associated with the force main will be necessary to transport the wastewater from the service area to the reclamation facility. The proposed pump station location is just west of State Route (SR) 3 in the Belfair urban growth area (UGA) (see Figure 3-1). A transmission force main would extend from the pump station east to the reclamation facility (see Figure 3-1). The pump station would occupy approximately 0.10 acre.

The force main associated with this alternative would be 12 inches in diameter and roughly 7,000 linear feet (refer to Figure 3-1). Construction of the force main is estimated to take approximately 9 months.

Service Area Options

The areas proposed to be served by the centralized wastewater service include: (1) the Belfair UGA, and (2) part of an area proposed for designation as a Limited Area of More Intense Rural Development (LAMIRD) for a portion of the North Shore area referred to as Zone A (Figure 3-2).

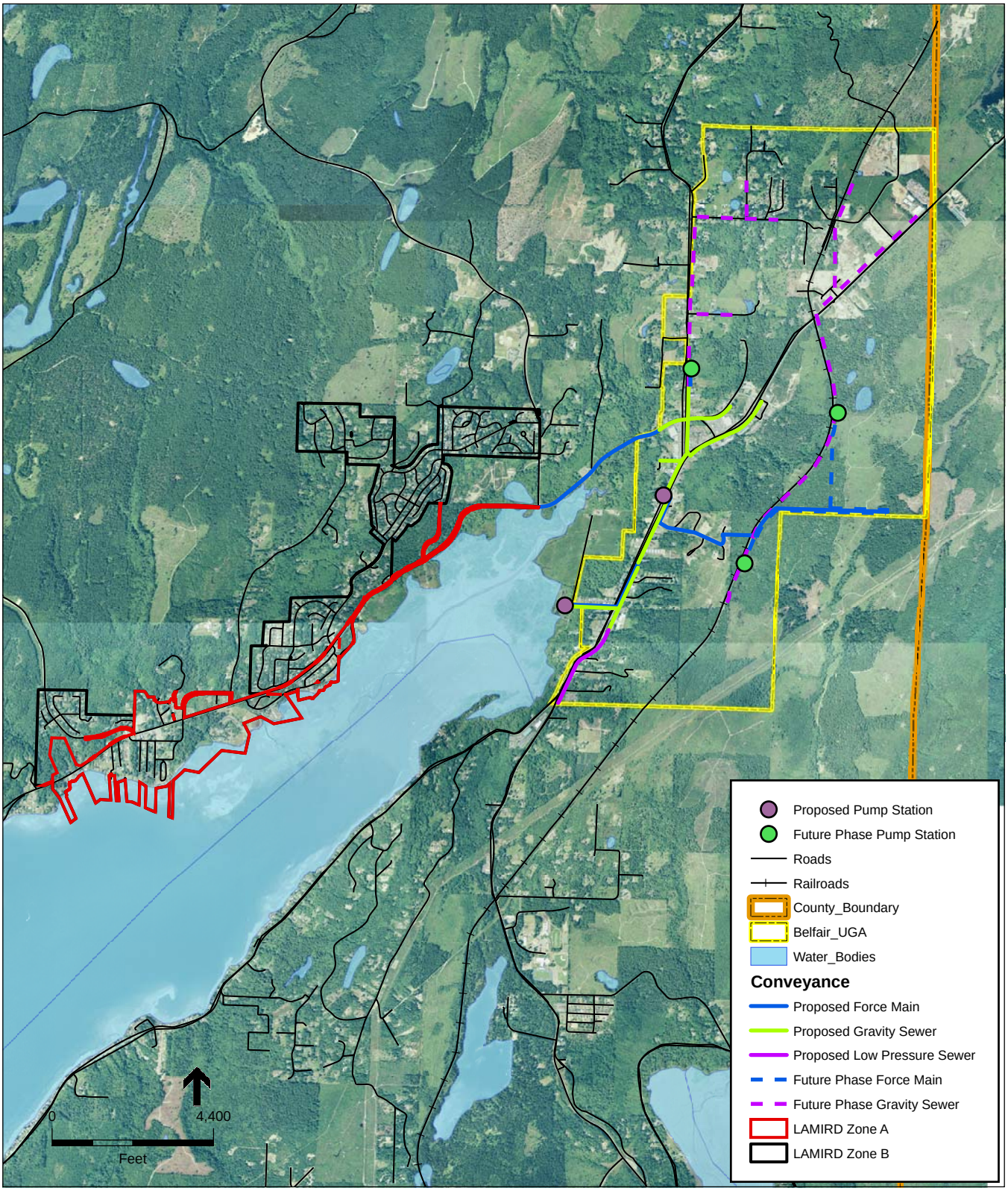


SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 3-1

Belfair/Lower Hood Canal Water Reclamation Facilities

Alternative 1



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 3-2

Belfair/Lower Hood Canal Water Reclamation Facilities

Proposed Service Area

The Belfair UGA is depicted on Figure 3-2. Local wastewater collection in this area will be provided by a series of gravity sewers and pump stations (refer to Figure 3-2). Initially, local collection lines would run along SR 3 in the central/southern portion of the UGA, and as development expands within the UGA, additional collection lines would be provided to the east and north within the UGA (refer to Figure 3-2). Areas outside the UGA would not be served by this project except for a select area within the proposed LAMIRD as defined below. (Refer to Section 4.10 for further discussion of the LAMIRD).

The purpose of the LAMIRD designation would be to allow very limited centralized wastewater treatment service for existing North Shore developments that have likely contributed to the declaration of a severe public health hazard in Lynch Cove, along with other water quality problems including low dissolved oxygen.

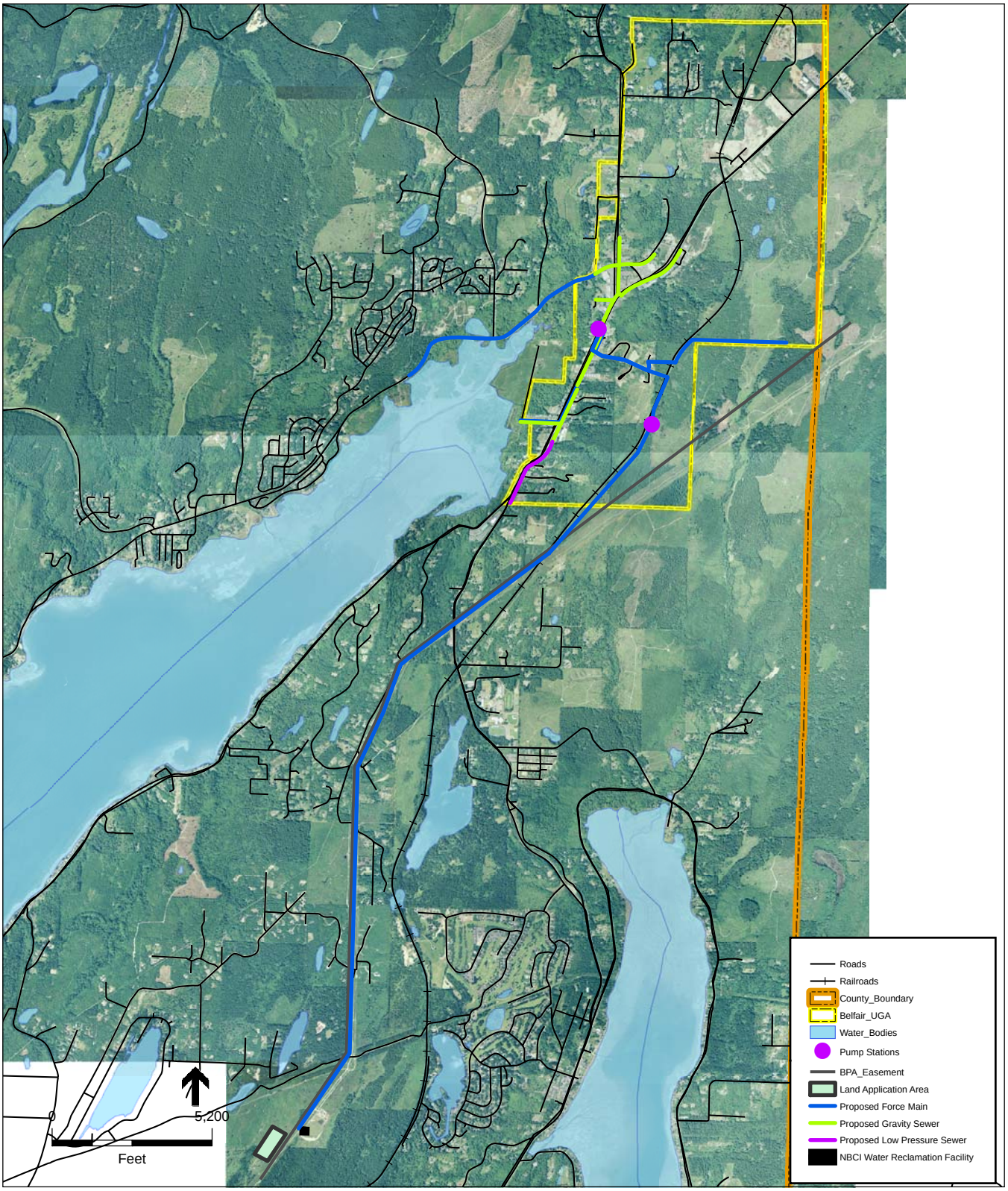
The LAMIRD has been identified for phased implementation. The first phase, designated LAMIRD Zone A in this EIS, would be connected to the wastewater reclamation facility at the same time as the Belfair UGA. The area included in LAMIRD Zone A was identified as having a high probability of contributing to bacterial water quality contamination in Lynch Cove (AESI, 2005). This area includes the developed portion of the North Shore lowland area that parallels the Hood Canal waterfront along North Shore Road (SR 300) from near the Union River to approximately 0.75 mile southwest of Belfair State Park. This area is developed at relatively high densities with septic systems.

The area designated LAMIRD Zone B includes clustered areas of existing development along the upland slope and plateau north of SR 300. These areas have been identified as having a possible contribution to bacterial contamination in Lynch Cove. However, further assessment of this area is required to determine whether it is actually contributing to water quality problems. The LAMIRD Zone B area would continue to be evaluated for the potential to contribute to water quality problems in Hood Canal, and if studies indicate that this area is contributing to bacterial and/or nutrient contamination, options for improved wastewater management could be considered. These options could include connection to the centralized wastewater reclamation facility, or other options such as clustered on-site systems, enhanced individual on-site systems, or some other enhanced decentralized approach.

3.2 Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Treatment Process and Reclamation Location

Alternative 2 represents the expansion of the existing North Bay/Case Inlet (NB/CI) water reclamation facility (Figure 3-3). To accommodate flows originating from the Belfair area, the existing NB/CI service area would require the installation of an additional secondary treatment process at the site. The reclaimed water produced at the NB/CI treatment facility would be land applied.



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 3-3

Belfair/Lower Hood Canal Water Reclamation Facilities

Alternative 2

The existing NB/CI facility is a Sequencing Batch Reactor (SBR) system with effluent filtration, UV disinfection, and land application of Class A reclaimed water. To accommodate projected flows, modifications would be necessary at the NB/CI plant. In addition to the SBR system, an MBR system would be installed to achieve the overall treatment capacity of 0.71 MGD, with a peak capacity of 2.5 MGD. As with Alternative 1, UV disinfection will be utilized. The existing Class A storage pond capacity would be increased by 18.5 MG, to a total of 32.6 MG, to maintain 46 days of storage capacity in the event that weather conditions (extreme wet or cold weather) do not permit irrigation. Construction of the expanded facility is estimated to occur over 15 months.

The existing spray field irrigation area of 20 acres will be increased by 31 acres, for a total timber application area of 51 acres. The design application rate for the facility will be an agronomic rate of 1.83 inches per day, applied to one-third of the area.

Transmission of the wastewater from the collection area to the NB/CI facility would require two pump stations. The first pump station would be located in the UGA, similar to Alternative 1. The second pump station would be located upland, in the southeast corner of the UGA to convey wastewater south to the NB/CI site. A 12-inch-diameter force main would be constructed in a southerly direction along the railroad and Bonneville Power Administration (BPA) right-of-way (refer to Figure 3-3). Total force main length would be approximately 33,600 linear feet. Construction of the forcemain and pump stations would take approximately 15 months.

Service Area Options

The area served by this alternative includes: (1) the Belfair UGA, and (2) the LAMIRD as described above for Alternative 1.

3.3 Alternative 3 – No Action

Alternative 3 represents the No Action Alternative. Under this alternative, wastewater management would remain unchanged from current conditions. Wastewater collection and centralized treatment would not be provided, and local collection systems would not be constructed. On-site septic systems and drainfields would continue to treat wastewater by soil infiltration and discharge to groundwater.

3.4 Alternatives Identified but not Evaluated in the EIS

The 2006 Wastewater Facility Plan Supplemental Information describes the South Kitsap Industrial Area (SKIA) alternative. This alternative represents conveyance of flows generated in the Belfair area to a proposed collection and conveyance system within the SKIA, and eventual conveyance to Port Orchard Sewer District's system and the Karcher Creek wastewater treatment facility. SKIA represents a UGA within Kitsap County that encompasses the Port of Bremerton airport and surrounding area. This alternative is no longer being considered due to the uncertainties associated with the schedule of preparing intergovernmental agreements. SKIA is developing a Facilities Plan, and the implementation schedule does not appear to match the needs and funding-imposed timing for the Belfair UGA. The relatively long distance from the Belfair UGA to the Karcher Creek treatment plant and the cost associated with conveying wastewater that distance are also unfavorable.

CHAPTER 4.0 NATURAL AND BUILT ENVIRONMENT

4.1 Earth

Affected Environment

This section discusses earth resources within and around the project vicinity, including the rural community of Belfair and parts of Mason County. The earth environment discussed in this chapter includes geology, soils, erosion, landslide hazards, and seismic hazards. These factors are important in determining the potential for impacts on physical resources and their effect on the reclamation and conveyance facility design, construction, and operation. Potential impacts and mitigation measures for each alternative are also discussed below.

Relevant Regulations

Chapter 17.01, Geologically Hazardous Areas, of the Mason County Resource Ordinance (MCRO) establishes regulations for the protection of sensitive areas, including geologic (seismic), landslide, erosion, and steep slope hazards (Mason County 2006). In addition to fulfilling the mandates of the Washington State Growth Management Act, its primary purpose is to fulfill the legislative intent of Mason County to protect the public health, safety, and welfare of the citizens. This section of the MCRO establishes prohibitions, mitigation requirements, and minimum standards for the use and development of properties that contain or adjoin these sensitive areas.

The Belfair reclamation facility structures would be designed in accordance with the 2003 International Building Code (IBC) adopted by Washington State in 2004. The code provides methods for determining ground acceleration rates for seismic activities that have a 10 percent chance of occurrence over a 50-year design life (roughly a 500-year recurrence interval) for municipal works such as water reclamation facilities.

Physical Setting

The project vicinity encompasses portions of the Lower Hood Canal watershed around Lynch Cove, including the community of Belfair and other unincorporated areas extending along the north shore of Hood Canal to Belfair State Park, and to the southwest approximately five miles to the NB/CI reclamation facility. The elevation of the project area ranges from mean sea level (MSL) along the shores of Hood Canal to approximately 350 feet in the rolling hills between Hood Canal and North Bay.

Regional Geology and Topography

The geology of the project vicinity and the Lower Hood Canal region is influenced by geologic uplift and glacial activity, similar to other coastal regions in the Puget Sound basin. The Olympic and Cascade Mountain ranges have caused lowland areas to be sites of deposition for sedimentary materials. The periods of glaciation followed by erosion and deposition result in the dominant topographic features located in the project vicinity, a low, rolling glacial moraine and a nearly level outwash plain.

The low-rolling hills are remnants of a Pleistocene glacial drift plain. The surface topography is irregular, with several depressional lakes and wetlands in upland areas and a few well-developed streams. During the Fraser glaciation, the most recent glacial period (12,000 – 15,000 years before present), the ice sheets in the area are estimated to have ranged from 2,000 to 4,000 feet thick. The deposits left from the glacial period consist of till, recessional outwash, and advance outwash sediments. Most of the deposits are composed of unconsolidated sands and gravels that readily erode.

As the glacial period ended and the ice retreated, numerous streams and river valleys were created by the glacial meltwater. Many of these drainage networks remain today including Union River and Mission and Coulter Creeks. Most of the drainages in the area have deeply incised, 'V'-shaped valleys that are still actively eroding through layers of glacial deposits, carrying the material into Hood Canal and North Bay/Case Inlet. Large amounts of gravel and cobbles are being transported from the steeper gradient uplands and are being deposited in the low-gradient confluences with Puget Sound (Gray & Osborne, Inc., 2003).

Soils

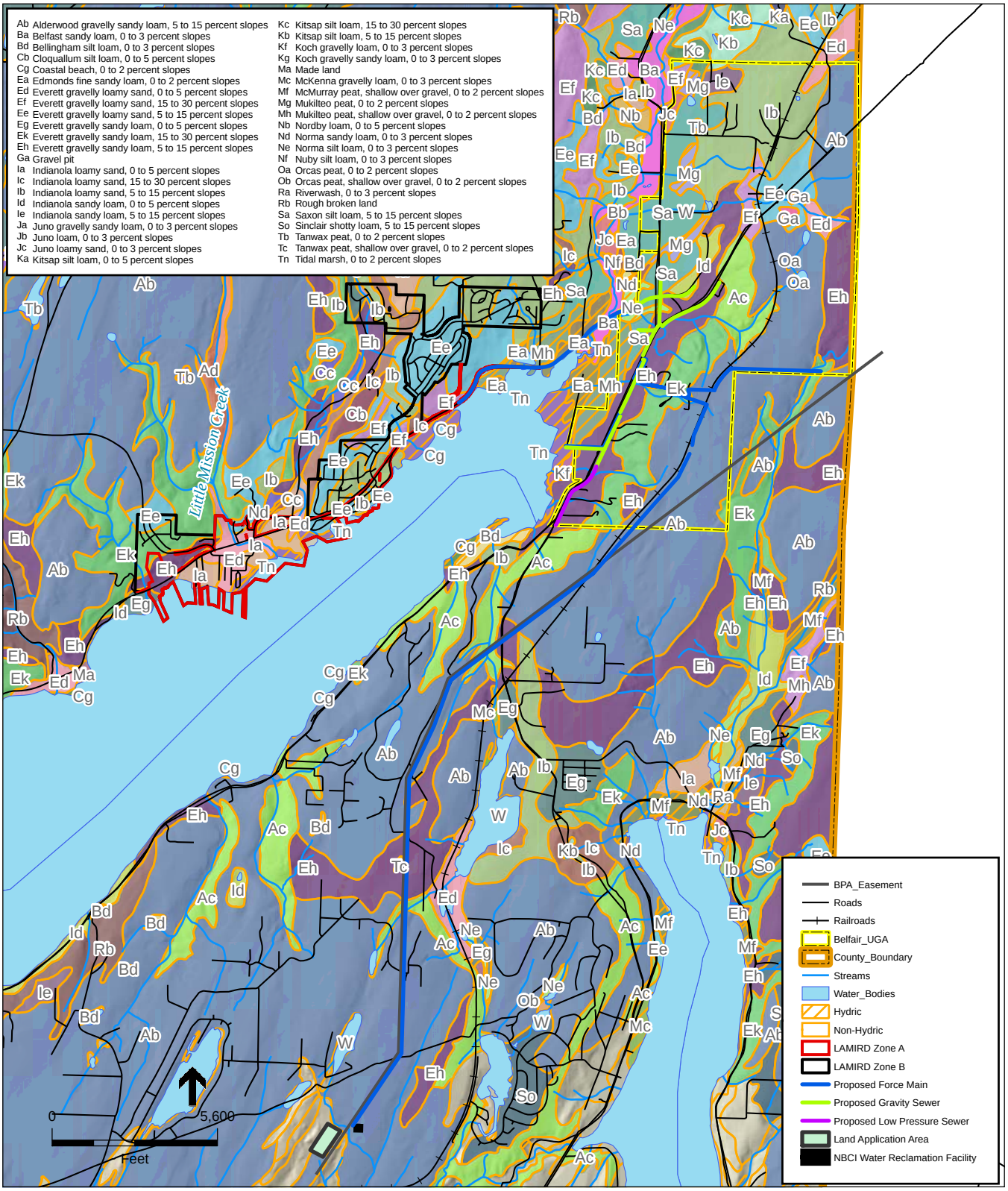
According to the U.S. Department of Agriculture Natural Resources Conservation Service (formerly the Soil Conservation Service), there are five primary soil associations in the project vicinity (U.S. Soil Conservation Service, 1960). These soils are of a glacial or alluvial origin, and may be highly variable between locations. The deposits consist of unconsolidated silts, sands, and gravels, and typically cover a layer of hardpan lying just below the surface. Hardpan layers generally limit the placement of wastewater drainfields. The soil series are briefly described in Table 4.1-1, and their locations and extent are shown on Figure 4.1-1.

In general, the soils in the project vicinity are well suited for agriculture and timberlands. However, poor drainage and a seasonal high water table, especially in the lowlands along Hood Canal and the floodplains of the Union River, result in moderate to severe limitations for urban development and make site preparation more costly (U.S. Soil Conservation Service 1960).

Table 4.1-1. Soil Characteristics in Project Vicinity

Soil Series	Description	Drainage Characteristics and Development Limitations
Alderwood	Moderately well-drained soils underlain by consolidated glacial till (hardpan) at a depth of 24 to 40 inches. Found in upland areas at elevation between 100 and 800 feet.	Soil characteristics place severe limitation on recreational and engineering uses due to their seasonal high water table (2 to 3 feet) and very slow permeability in the hardpan layer for all slope classes. Alderwood soils in the project area include:
		Ab soils (0-5% slope): Used for urban development; slight to no limitations for building foundations; some limitations for septic fields due to the high permeability of surface soils and very low rate of permeability in the hardpan.
		Ab soils (5-15% slope): On rolling hills where runoff potential is slow to medium and erosion hazards are moderate; used for urban development; presents slight to moderate limitations for building foundations and septic fields due to high permeability of surface soils and slope.
Edmonds	Very deep, poorly drained soils formed in loess and volcanic ash over glacial outwash with depths reaching up to 60 inches. Found on outwash terraces and plains at elevations of 50 to 300 feet. Slopes are 0 to 2 %.	Soil characteristics place severe limitations on recreation and engineering uses due to a seasonal high water table (0 to 1 foot) unless drained. Most areas with Edmonds soils are drained and used mainly for cropland and pasture. Edmonds soils in the project area include:
		Ea soils (0-2% slope): High limitations for foundations and septic fields due to a high water table and poorly drained soil structure.
Everett	Somewhat excessively drained soils underlain by very gravelly sand at depths ranging from 18 to 36 inches. Found on terraces and terrace fronts on rolling to moderately steep slopes.	Soil characteristics adversely affect construction of dikes, levees, reservoirs, and embankments. Given the high permeability of this soil, there is a possible pollution hazard associated with septic fields and sewage lagoons. Everett soils in the project area include:
		Ed soils (0-5% slope): Slight to no limitations for low building foundations and septic fields; severe limitations for shallow excavations and sewage lagoons; rapid permeability.
		Eh soils (5-15% slope): On rolling hills where runoff is slow to medium and erosion hazard is slight to moderate; used for urban development; presents slight to moderate limitations for low building foundations and septic fields and severe limitations associated with shallow excavations and sewage lagoons.
		Ek soils (15 - 30% slope): On steeper slopes presents limitations for foundations, shallow excavations, septic fields and sewage lagoons.
Le Bar	Deep, well drained soils formed in loess and old alluvium with depths reaching up to 72 inches. Found on terraces and terrace escarpments at elevations 100 to 800 feet. Slopes are 0 to 65%.	Soil characteristics place few limitations on recreation and development uses. Well draining soil is appropriate for septic tanks and drainfields.
		la soils (0-5% slope): Slight to no limitations for low building foundation and septic fields; high limitations for shallow excavations and sewage lagoons due to high rate of permeability.
Mukilteo	Deep, very poorly drained soils formed in partially decomposed woody and herbaceous organic material sometimes greater than 72 inches in depth. Located in depressional areas on glacial till plains and outwash plains, or in abandoned glacial stream channels at elevations ranging from near sea level to 1000 feet. Slopes are 0 to 2 %.	Soil characteristics place severe limitations on recreation and development uses due to a high seasonal water table (0 to 1 foot) and a high concentration of organic material in the soil composition. The poor draining soil also places severe limitations on septic fields. Most soils have been cleared and drained and are used for pasture hayland or cropland. *Mh soils* (0-2%): High limitations for foundations and septic fields due to a high water table and poorly drained soil structure.

Source: Soil Conservation Service, 1960.



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006

Figure 4.1-1

Belfair/Lower Hood Canal Water Reclamation Facilities

Soils and Drainage

Geologic Hazard Areas

The Mason County Resource Ordinance, Chapter, Chapter 17.01 identifies three types of geological hazards for the area including landslide, seismic, and erosion hazards (Mason County, 2006). Erosion and landslide hazard areas typically occur in sloped areas leading from the lower elevation river valleys to higher elevation plateaus. Landslide hazard areas are lands that due to a combination of slope inclination and soil permeability have an increased potential for soil slumping and other earth movement.

Potential landslide hazard areas meet the following criteria:

- Areas with indication of earth movement such as debris slides, earth flows, slumps, and rock falls;
- Areas with artificially steepened slopes such as cuts or fills;
- Areas containing soft or potentially liquefiable soils;
- Areas unstable as a result of stream incision, bank erosion, and undercutting by wave action;
- Slopes greater than 15 percent (8.5 degrees) with a permeable sediment overlying a relatively impermeable sediment or bedrock such as glacial till or that contain springs or groundwater seepage.

Erosion hazard areas are lands that are more susceptible to excessive erosion that can result in bank destabilization and increased sedimentation to streams, rivers, lakes, and wetlands. Although erosive processes are normal in fluvial (stream and river) environments, these processes can be accelerated by development activity that exposes and disturbs soils so they are more vulnerable to erosive forces. Further, increased areas of impervious surfaces reduce the infiltration of rainfall, increase stormwater runoff, and result in even greater erosion potential. Increased runoff, erosion, and sedimentation may adversely affect the physical and biological characteristics of streams and other water resources.

Seismic hazard areas are lands that are particularly susceptible to damage from earthquakes and other seismic activity. Due to a combination of soil and groundwater conditions, these areas are subject to severe risk of ground shaking, subsidence, or liquefaction of soils during earthquakes. Liquefaction occurs when the structural strength of saturated, unconsolidated soil is greatly reduced as a result of seismic shock. Liquefaction is most likely to occur in areas typically underlain by soft or loose saturated soils such as alluvium and have a shallow groundwater table. Buried structures (such as foundations and pipelines) can become displaced during liquefaction. Common seismic hazard areas include:

- Areas along geologic faults;
- Areas of poorly compacted artificial fill;
- Areas with artificially steepened slopes;
- River deltas;
- Post-glacial stream, lake or beach sediments;

- Areas designated as potential landslide hazard areas;
- Bluff areas;
- Deep road fills and unsupported fills.

Existing Conditions at Reclamation Facility Sites

Alternative 1 – Reclamation Facility near Belfair

The surface elevation for the 48-acre reclamation facility and application site ranges from 240 to 300 feet MSL. According to the soil maps (SCS, 1960) the facility location for Alternative 1 is comprised almost entirely of Alderwood gravelly sand loam, Ab, 5-15 percent slope; Everett gravelly sandy loam, Eh, 5 – 15 percent slope; or Ek, 15 – 30 percent slope with a surficial geology comprised of glacial till. Advanced outwash is found at the bottom of the Coulter Creek valley.

Geographically mapped data for Mason County show the proposed facility site is outside of any erosion, landslide, or seismic hazard areas. A NEPA Environmental Report (Gray & Osborne, 2001) was prepared for the site as part of preliminary investigations for facility development to determine if environmental hazards may exist. No evidence of potential contamination was identified.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

The NB/CI reclamation facility currently provides sewage reclamation services to the rural community of Allyn. The expansion of the surface area would increase the land application area to 51 acres ranging in elevation between 300 and 340 feet MSL. The soils located at the NB/CI reclamation facility are very similar to those found at the Alternative 1 site, dominated by Alderwood and Everett series on relatively shallow slopes (less than 15 percent). The surficial geology of this site is also similar to the glacial till of Alternative 1. A study was conducted on the facility site to determine if environmental hazards may exist on the site. No evidence of potential contamination was identified (Gray & Osborne, 2003).

Land Application Areas

Soil condition is the most important factor of concern for aboveground land application. Soils such as the Everett series found on the proposed sites, with grades under 15 percent, a usable soil column depth greater than 5 feet, and permeability greater than 0.5 inch per hour, are well suited for land application. With the use of highly treated reclaimed water such as what will be produced in Alternative 1 and 2, soils of the Alderwood series, which are also found on the sites, are appropriate for land application.

Service Area

The primary soils within the LAMIRD and Belfair State Park are composed of Everett and Indianola series. Along the conveyance corridor the soils are highly variable ranging from Everett series to Mukilteo peat. Geographically mapped data for Mason County show several

areas of geologic hazard along the conveyance route. Much of the route is located on unconsolidated soils that meet the characteristics for liquefaction during seismic events.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

No significant impact to earth resources is anticipated during construction of the reclamation facility. Adverse impacts during construction can be largely mitigated with construction best management practices (BMPs) and compliance with Mason County Resource Ordinance and applicable permit requirements and conditions.

Approximate clearing and grading disturbance areas for each of the facility components for Alternative 1 are shown in Table 4.1-2.

Table 4.1-2. Clearing and Grading Disturbance, Alternative 1

Facility	Area	Volume (cubic yards)
Reclamation facility *	2 acres	11,700
Raw sewage holding pond*	3 acres	18,000
Class A holding pond *	10 acres	59,500
Land application site	33 acres	Not applicable
Pump station *	0.1 acre	950
Belfair UGA Collection **	approximately 2,400 acres	19,000
LAMIRD Collection **	approximately 1.9 acres	17,000
UGA force main pipeline **	3 feet wide by 3 to 8 feet deep, approximately 7,800 feet long	1,500
LAMIRD force main pipeline**	3 feet wide by 3 to 8 feet deep, approximately 13,000 feet long	2,500

*All excavation volumes are approximate determinations based on amount of area disturbed and projected overall excavation quantities for facility components and service areas.
**Excavation volumes for the conveyance/transmission lines have been adjusted for backfill potential.

Erosion Impacts. Construction of the reclamation facility could result in localized erosion. In the work zone, construction would expose soil and remove vegetation, leaving the area vulnerable to erosion during rainfall. Construction spoils generated from clearing and grading at the reclamation facility site would be stockpiled on-site prior to being trucked off-site. Similarly, spoils from trenching for the conveyance pipeline would be temporarily stockpiled in the construction easement. This stockpiled material could present an erosion hazard; if uncontrolled, such erosion could result in impacts to streams/rivers and wetlands, particularly

along the conveyance line between the LAMIRD and the Belfair UGA (see Section 4.3, Surface Water Resources).

Soil Contamination. Although there is little to suggest that contaminated soils or groundwater exist in areas proposed for facility development, if contamination is discovered during earthwork, construction activities have the potential to result in the distribution of these contaminated soils or groundwater to uncontaminated areas. If contaminated soil or groundwater were discovered during construction, it would be mitigated and addressed in accordance with local, state, and federal regulations. Construction activity on the facility site for Alternative 1 could result in potential contamination of soil if chemicals such as fuels or lubricants were to spill or leak from construction vehicles or equipment. The potential for the contaminants to impact the soil would depend on the nature and quantity of the spill, time between the spill and the cleanup, depth to groundwater, and geology of the area. See the mitigation measures for Alternative 1 below, and Section 4.3, Surface Water Resources, for further details about mitigation.

Vibrations and Ground Settling. Construction methods for the reclamation facility may result in vibration and ground settlement that could damage adjacent structures or utilities. These methods include installation of driven piles, auger cast piles, or sheet piles, and open-cut construction.

Ground settlement could potentially occur through groundwater withdrawal during construction. The greatest potential is where the water table is close to the land surface, specifically at the pump station sites and along the LAMIRD conveyance line. Mitigation measures discussed later in this section could be used to reduce the potential for impacts from vibration or ground settlement.

Conveyance Force Main. The majority of construction impacts for the conveyance force main are similar to those described for the reclamation facility. However, an estimated four to six miles of 12-inch pipeline would be necessary to convey wastewater from the LAMIRD and Belfair UGA to the proposed reclamation facilities in Alternative 1. Trenches would likely range from approximately three feet wide by three to eight feet deep. Excavation volumes would range from approximately 1,750 to 4,650 cubic yards per mile of pipeline construction. Excavated soils would be used for backfill when possible; however, potentially large quantities of earth will require appropriate disposal. Bedding material will also need to be imported to provide for a solid foundation for the pipeline. For additional discussion, see the mitigation measures below.

The conveyance force mains will be constructed in the broad valley of the Union River, inside the UGA and along the north shoreline of Hood Canal. This area has a relatively shallow groundwater table, and is susceptible to contamination due to the relatively high permeability of the valley alluvium and shoreline soils. Implementation of mitigation measures would reduce the potential for this impact.

Pump Station. The majority of construction impacts for the pump station are similar to those described for the reclamation facility and conveyance force main.

Land Application. There are no construction impacts on earth resources for the land application site.

Service Areas. The construction impacts for the service areas are included in the impact descriptions provided above for the reclamation facility, pump station, and conveyance force mains.

Operational Impacts

No significant adverse impacts to earth resources are anticipated after construction of the reclamation facility and associated infrastructure. Best management practices would minimize impacts related to operational activities that have the potential for erosion.

Reclamation Facility. Sediment erosion into surface water could occur during the operational life of the reclamation facility if stormwater runoff is not controlled. The reclamation facility would be designed to incorporate all required measures to control and treat stormwater runoff to minimize or prevent the potential for long-term erosion (see Section 4.3, Surface Water Resources, for further detail). Maintaining vegetation and providing adequate runoff controls in accordance with state and local regulations would reduce the erosion potential.

Conveyance Force Main. Foundations and pipes that are located in loose, saturated sediments such as those present in the Union River valley and Hood Canal shoreline are potentially subject to liquefaction. As previously discussed, much of the service area is designated as a seismic hazard area and may be susceptible to liquefaction during earthquake events. Liquefaction can result in differential settlement and damage to structures with shallow foundations and to utilities, embankments, and pavement. Pipelines would be designed in accordance with generally accepted seismic standards.

Pump Station. The majority of operations impacts for the pump station are similar to those described for the reclamation facility and conveyance force main.

Land Application. Sediment erosion can become a primary impact if the land application zone is overly saturated. Monitoring of discharge areas will be required, so the potential for overwatering is low. Overly saturated soils can create anaerobic conditions resulting in plant mortality that could ultimately decrease vegetative cover and increase the propensity for erosion.

Service Areas. There are no earth-related operational impacts to the service areas.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Expansion of the reclamation facility as well as construction of the pump stations and transmission and conveyance lines both within and outside the service areas could result in similar impacts of erosion, settlement, and possible pollution addressed in Alternative 1.

Approximate clearing and grading disturbance areas for each of the facility components for Alternative 2 are shown in Table 4.1-3.

Table 4.1-3. Clearing and Grading Disturbance, Alternative 2

Facility	Area	Volume (cubic yards)
Reclamation facility expansion *	2 acres	11,700
Land application site expansion	20 acres (51 acres total)	Not applicable
Pump stations (2) *	0.1 acre each	950 cy each
Belfair UGA Collection **	approximately 2,400 acres	19,000
LAMIRD Collection **	approximately 1.9 acres	17,000
UGA force main pipeline **	3 feet wide by 3 to 8 feet deep, approximately 33,600 feet long	13,600
LAMIRD force main pipeline**	3 feet wide by 3 to 8 feet deep, approximately 13,000 feet long	2,400

*All excavation volumes are approximate determinations based on the amount of area disturbed and projected overall excavation quantities for facility components and service areas.
**Excavation volumes for the collection/conveyance/transmission lines have been adjusted for backfill potential.

Operational Impacts

No significant adverse impacts to earth resources are anticipated after expansion of the reclamation facility and associated infrastructure. The possibility for localized erosion on and around reclamation facilities, as well as possible impacts for building within a liquefaction zone are discussed in Alternative 1.

Alternative 3 – No Action

Impacts to earth resources would occur as a result of the repair, replacement, and installation of new individual on-site septic systems. Operational earth-related impacts associated with Alternative 3 are not anticipated.

Cumulative Impacts

No significant cumulative impacts to earth resources are anticipated for any of the alternatives examined. However, if construction activities associated with the reclamation facility were to coincide with other local construction projects, such as the SR 3 Belfair Bypass, there is the potential for cumulative impacts to earth resources during the construction period.

Also, with the establishment of sewer service, growth can occur within the Belfair UGA as prescribed by the comprehensive plan, which could result in an increase in new construction. Additional earthwork can be anticipated from new development activities, cumulatively contributing to impacts on earth resources.

Mitigation Measures

Construction

Erosion

Mitigation measures for erosion and sedimentation control that are suitable for the site conditions could be included as part of the project design and construction. A temporary erosion and sediment control (TESC) plan would be required by the Washington State Department of Ecology (Ecology) and Mason County before construction begins. At a minimum, the plan could include measures for the following:

- Reduction of the volume of soil hauled off-site;
- Protection of disturbed earth surfaces;
- Protection of slopes and soil stockpiles;
- Protection and stabilization of drainageways;
- Retention of sediment.

All construction activity would be required to use construction best management practices (BMPs) to minimize erosion and sedimentation impacts. Construction BMPs include commonly specified and implemented features that are mandated by Mason County guidelines, as well as additional measures deemed appropriate for the project. The project would also be required to comply with conditions of the National Pollutant Discharge Elimination System (NPDES) stormwater permit for construction.

Construction BMPs that could be used to control construction-related runoff and erosion include the following:

- Maintaining vegetation and providing adequate surface water runoff systems;
- Conducting earthmoving activities during dry weather;
- Limiting the amount of area that is cleared and graded at any one time, and scheduling construction activities soon after an area has been cleared and stripped of vegetation;
- Constructing temporary siltation/sedimentation ponds to detain runoff waters and trap sediment from erodible areas;
- Revegetating, hydroseeding, or paving disturbed areas as soon as possible after completion of construction;
- Covering soil stockpiles with plastic sheeting and weights;
- Placing straw, mulch, or commercially available erosion control blankets on slopes that require additional protection;
- Placing straw bales or silt fences to reduce runoff velocity in conjunction with collection, transport, and disposal of surface runoff generated in the construction zone.

Any stream/river crossings would be consistent with the requirements of applicable permitting agencies, including the U.S. Army Corps of Engineers, the Washington State Department of Fish and Wildlife, and Ecology.

During construction, monitoring programs could be required to ensure compliance with the TESC plan and with local regulatory requirements. The construction contractor and/or Mason County staff could measure parameters such as turbidity, temperature, and pH of surface water discharge and visually monitor the site for signs of erosion and for correct implementation of control measures.

Contaminated Soils

A hazardous materials management plan would be prepared to specify procedures, including identification, storage, and disposal, for work in areas where contaminated soil could be encountered. The plan could prioritize detecting areas, avoiding potential sites, then conducting environmental site assessments and hazardous material surveys prior to right-of-way acquisition or construction of the conveyance pipeline. Mason County would comply with hazardous waste regulations (Model Toxics Control Act rules per Chapter 173-340 WAC) and standard procedures to determine the nature and extent of contamination.

Vibration and Settlement

Mitigation for the potential impacts due to vibration and settlement could include surveying adjacent structures before, during, and after construction; designing construction methods to avoid impacts; and developing a construction monitoring program.

After a conveyance corridor is selected, a geotechnical exploration program with borings more closely spaced along the alignment could be undertaken where appropriate to reduce the number of unknowns that might contribute to undesirable settlement. Surface settlement can be mitigated by grouting or other ground improvement techniques to stabilize subsurface soils.

To mitigate the impact of excavations on ground stability and provide a safe working environment, all excavation sloping and shoring must be designed and constructed in accordance with U.S. Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Administration (WISHA) standards. The engineer would set more stringent requirements if site-specific conditions required special treatment to maintain stability.

Operation

Development that occurs consistent with adopted plans and regulations will minimize the growth-related impacts to earth.

Handling Chemicals

The reclamation facility would be designed to prevent leaks and spills during operation, and plans would be developed to monitor structures and to respond if a leak were detected. The design could include primary and secondary containment of any chemicals handled on-site and collection of spills in process areas. Redundant tanks and equipment could be provided to allow isolation of individual units for inspection and repair.

Seismic Hazards

Permanent reclamation facilities would be designed to withstand the level of earthquake hazard anticipated for this area. Seismic accelerations and structural design would be based on the 2003 International Building Code (IBC).

The 2003 IBC requires earthquake design to conform to a maximum considered earthquake (MCE) with a 2 percent probability of occurrence in 50 years. All permanent structures would be designed for the MCE, as well as with the other general provisions of the IBC, which specifies criteria for:

- Structural design;
- Liquefaction analyses;
- Ground deformation/pseudo-static slope stability analyses.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to earth resources are expected to result from construction or operation of the system.

4.2 Air Resources

Affected Environment

This section discusses the current air quality conditions in the Belfair area of Mason County, within the project vicinity. Applicable state and local regulations are summarized. The air environment includes climate, air quality, and prevailing wind conditions. These factors are important in determining the potential for air emissions and odor impacts, and they play an important role in reclamation facility design.

Air Quality Standards

Under the Clean Air Act (CAA), National Ambient Air Quality Standards (NAAQS) are established to protect public health and welfare by defining minimum acceptable levels of air quality to be achieved for criteria pollutants. NAAQS standards have been set for six criteria pollutants: carbon monoxide, sulfur dioxide, lead, ozone, and two categories of particulate matter. Standards have also been set for 188 hazardous air pollutants (HAPs) which are known or believed to cause human health effects when above specified levels.

Washington State regulates a set of toxic air pollutants (TAPs), which include the 188 HAPs and over 400 additional chemicals. The emission limits applicable to TAPs are known as allowable source impact levels (ASILs).

The Olympic Region Clean Air Agency (ORCAA) is the agency with primary responsibility for air quality compliance in Mason County. ORCAA regulates odors throughout the Olympic Peninsula area and enforces federal, state, and local laws. Odors and emissions that may be a detriment to a person or property are addressed under ORCAA Regulation I, Article 9.11(a); Chapter 70.94 RCW; and WAC 173-400-040(4) and (5). ORCAA requires a New Source Review (NSR) permit for the installation, modification, or construction of any facility or business that may emit air pollutants. According to ORCAA's Basic Air Quality Regulatory Requirements worksheet (ORCAA, 2006) this would include construction or modification of a reclamation facility.

Local Air Monitoring

The project site lies within the Puget Sound airshed, where air quality is greatly influenced by urban development, the Pacific Ocean, the mountains, and weather patterns. The Hood Canal and Puget Sound basins have a mild, modified marine climate characterized by cloudy, cool, and wet winters and relatively dry, mild summers. Temperatures are generally moderate with few extremely cold or hot days throughout the year (Western Regional Climate Center, 2003). When onshore airflow to the area is interrupted, the combination of urban activities, weather, and topography can lead to air stagnation and rising air pollution.

The average wind velocity within lowland Hood Canal areas is less than 10 miles per hour (mph). The prevailing wind direction is primarily from the southwest during the wet season (winter) and north or northwest during the summer. Occasional severe winter storms produce strong northerly winds.

Within the Hood Canal lowlands, there is typically sufficient wind throughout the year to disperse air pollutants released into the atmosphere. Air pollution is usually most noticeable in the late fall and winter seasons, under conditions of clear skies, light wind, and a sharp temperature inversion. Temperature inversions occur when cold air is trapped under warm air, preventing vertical mixing in the atmosphere. Inversions can last several days and can prevent pollutants from being dispersed by the wind. Inversions are most likely to occur during the months of October through February. If poor dispersion persists for more than 24 hours, it can result in the declaration of an "air pollution episode" by the state, or local "impaired air quality" by ORCAA.

ORCAA reports good air quality in Mason County and the Lower Hood Canal watershed. The air quality is in attainment of all federal air quality standards, and no violations of ambient air quality standards have been reported for this area (Gray & Osborne, 2001).

Existing air quality in the project area is typical of urban residential, commercial, rural, and agricultural areas. Sources of air pollutants in the project area include emissions from automobiles, woodsmoke from fireplaces, and emissions from yard maintenance equipment. Occasional or seasonally occurring odors and dust from agricultural activities (e.g., livestock operations, tilling) may occur in rural and agricultural areas.

Receptors Adjacent to Treatment and Conveyance Facilities

Receptors are people adjacent to treatment or conveyance facilities who would detect odors, should they occur. Sensitive receptors include relatively high densities of population, and/or populations that could have a higher level of sensitivity, such as hospitals, schools, daycare centers, or retirement centers. Both reclamation facility sites are located in areas surrounded by commercial forestry, with no adjacent residential or commercial uses. Proposed pump station locations have the highest potential to be located in areas surrounded by residential and/or commercial land uses. At this time, only general locations for pump stations have been identified, but the pump station siting process will incorporate land use considerations and the proximity of receptors. Refer to Section 4.10, Land and Shoreline Use, for additional discussion of land use and zoning within the project area.

Air Emissions from Wastewater Reclamation Facilities

Odor-causing substances that commonly occur in wastewater consist of both organic and inorganic compounds. The three areas within a reclamation facility with the highest potential of producing detectable odors are the pump station, headworks, and solids handling areas. Most odor-causing compounds form as a result of anaerobic decomposition of organic material containing sulfur and nitrogen. Odor emissions typically occur during warm periods and at points of turbulence within the collection and treatment processes. The presence and direction of prevailing breezes and the proximity of homes and other development to a reclamation facility influence the degree of impact, and impacts could vary as weather patterns change throughout the year.

Treatment of wastewater could result in the release of volatile organic compounds (VOCs) or aerosols. VOCs are compounds of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) that precipitate in atmospheric photochemical reactions. Aerosols are very small airborne droplets that may be generated at

aerated process points in a reclamation facility and can be carried through the atmosphere. Adverse impacts associated with VOCs and aerosols are typically minimized by enclosing the major sources of these pollutants within the reclamation facility to prevent untreated dispersion of VOCs and aerosols to the outside environment.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Construction-related air quality impacts under Alternative 1 generally would include generation of fugitive dust at construction sites during active construction as well as odors, carbon monoxide (CO), and particulates from construction equipment exhaust. Construction activities would continue for approximately 18 months from the onset of project work, with the period varying in length and timing for each of the various components, as discussed below. The magnitude of air impacts also depends on the proximity of construction activity to residences, businesses, schools, or other areas of human activity.

Reclamation Facility. Construction at the new reclamation facility near the Belfair UGA would occur for approximately 15 months. Construction-related air impacts, however, would occur at higher levels during initial clearing, grading, and excavation activities. Because the area is dominated by utility right-of-way and commercial forest land uses, there are few people close to the proposed reclamation facility site who would experience construction air impacts.

Conveyance Force Main. Construction of the force main would occur over a 9-month period. During this period temporary air impacts would occur as described above. Receptors along the proposed force main corridor include the businesses and residences surrounding portions of SR 300, SR 3, NE Old Belfair Highway, NE Clifton Lane, and several other Belfair UGA roads (Figures 3-1 and 4.14-1). Residents in these areas would likely notice increased dust during peak periods of construction. Impacts would be temporary and are not expected to be significant.

Pump Stations. Construction of the pump station would occur over a 9-month period. During this period temporary air impacts would occur as described above. Receptors in the vicinity of the proposed pump station location include the businesses and residences along a portion of SR 3 within the Belfair UGA (Figures 3-1 and 4.14-1). Impacts would be temporary and are not expected to be significant.

Land Application. Construction at the new land application site near the Belfair UGA would occur for approximately 6 months. Construction-related air impacts, however, would occur at higher levels during initial clearing, grading, and excavation activities. There are few people near the proposed reclamation facility site who would experience air impacts because the area is dominated by utility right-of-way and commercial forest land uses.

Service Area. Construction-related impacts in the service area relate largely to increased dust and vehicle emissions. These impacts would be localized and would depend on wind and general weather conditions.

Belfair UGA. Construction of the local conveyance system and the pump stations in the Belfair UGA would result in air impacts during active construction, as described above. Impacts would vary over time and space within the UGA, with impacts to individual residential and business receptors occurring only when local conveyance construction is active. Construction of a pump station within the Belfair UGA has the potential to affect both businesses and residences for a period of several months; most impacts would likely be related to increased dust deposition on cars, outdoor furniture, etc. The siting process for the pump station and design of the conveyance lines will incorporate land use considerations, to avoid significant impacts to individual residences or businesses. A more detailed land use analysis would be conducted, including an evaluation of zoning and potential future land uses as well as an assessment of existing uses, and potential sensitive receptors would be avoided to the greatest extent possible. All construction-related impacts would be temporary and no significant impacts are expected.

LAMIRD. As described above for the Belfair UGA, construction of the local conveyance system in the LAMIRD would result in air impacts such as the generation of fugitive dust, odors, CO, and particulates. Impacts would follow the active construction area, which will include much of the LAMIRD area as local residences are connected to the sewer line. Nearly all uses within LAMIRD Zone A and Zone B are residential, with the exception of small commercial areas and parks. All impacts would be temporary and no significant impacts are expected.

Operational Impacts

Operational impacts would predominantly entail odors created by the bacterial breakdown of sewage in wastewater. The magnitude of air impacts depends on several factors, including the length of wastewater transport time, the level of treatment, the design of the water reclamation facility, and proximity of receptors. Odors could occur at all locations where the wastewater system vents to open air. Odor emissions are most likely to occur during warm weather and at points of turbulence within the collection and treatment processes. For this proposed system, those areas would likely occur within the reclamation plant and within the pump station.

With proper facility design, construction, and maintenance, odor generation associated with the project is expected to be minimal and manageable. Wastewater facilities, however, are often regarded as odor producers by the public. Public concern typically includes the feeling that wastewater facilities could lead to reduced property values and quality of life. Resistance from residents and business owners in proximity to project facilities would likely occur and must be addressed with a program of public education.

Reclamation Facility. There is potential for odor within the reclamation plant, particularly at the headworks and as part of the solids handling process. These areas will be managed to reduce odor potential in accordance with all applicable requirements and recommended procedures. Because there are no receptors in the vicinity of the reclamation plant, odor is not expected to be a problem.

Conveyance Force Main. The greatest potential for odor emissions would occur at manholes, particularly in areas where there is turbulence in the pipeline. The force main will be designed to minimize turbulence and other factors that could contribute to odor generation, but some odors may occur during periods of extended warm weather. Because of current design standards, odors are not expected to be noticeable under nearly all operating conditions.

Pump Station. For this project, a pump station will be used to pump untreated wastewater to the reclamation plant. The untreated wastewater will be collected at the pump station for a short period before being pumped for treatment. Odors could occur at the facility, particularly during warm weather periods. The pump station will be designed in accordance with all applicable requirements, which are intended to minimize odor potential, and if appropriate because of surrounding land use considerations, could include odor control facilities. The siting process for the pump station will attempt to locate the facility in an area that is not immediately adjacent to residences or potentially sensitive receptors.

Land Application. Odors are not anticipated from land application areas, as released water will be treated to Class A reclaimed water standards. Reclaimed water has virtually no detectable odor. Highly sensitive receptors such as parks, high-density areas, schools, or other areas where large numbers of people congregate outdoors regularly are not present near the proposed location of the land application areas.

Generation of airborne contaminants and/or aerosols is a concern with any wastewater reclamation process that involves using air to agitate the wastewater or where treated effluent is sprayed upon a land surface. Studies have indicated that potential aerosol-related health risk associated with spray irrigation of treated reclaimed water is very low, particularly when treated to Class A reclaimed water standards (Hardy, et al., 2006). The low probability of impact of aerosols from the Alternative 1 land application area is further reduced by the remote location of the application area. Refer to Section 4.9, Environmental Health, for additional discussion of this issue.

Service Area. Impacts associated with development of the service area including the Belfair UGA and the proposed LAMIRD Zones A and B are discussed below.

Belfair UGA. Increased density and development would likely occur in the UGA following installation of the sewer system. A trend toward urbanization in the Belfair UGA would result in increased construction and vehicle usage air impacts. In addition, there would likely be increased woodsmoke emissions associated with increased residential development.

Of all of the project components, the greatest potential for odor perception would likely occur within the Belfair UGA, because this area has the highest density of existing and future development. Location of manholes and other facilities with venting capacity could result in the potential for perceptible odors. The facilities will be designed to minimize this potential and, where possible, would be located away from adjacent residential or commercial development. Where required, appropriate odor control facilities would be installed.

LAMIRD. Because the LAMIRD is roughly 80 percent developed, zoning and the limited number of available lots will restrict additional development within LAMIRD areas. There is no anticipated increase in air-related impacts associated with the operation of the Alternative 1

system; however, there will be the potential for odor perception in areas adjacent to manholes, similar to that described for the Belfair UGA.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction impacts to air quality are similar to those described above for Alternative 1. Construction periods for each of the Alternative 2 elements are anticipated to be similar to those discussed in Alternative 1. Air quality impacts from construction of Alternative 2, however, would differ as described below.

The alignment of the conveyance force main as well as the additional pump station would differ from Alternative 1. Alternative 2 would require approximately an additional 26,600 feet of force main and an additional pump station along the railroad right-of-way to facilitate conveyance to the NB/CI facility (as depicted in Figures 3-3 and 4.14-1). Construction of the force main would remain within existing road, rail, and utility rights-of-way. The additional pump station would have the same footprint and pumping capacity as the pump station common to both action alternatives. However, impacts would occur in different locations and affect different receptors.

Operational Impacts

Operational impacts to air quality are similar to those described above for Alternative 1, except for the areas in which odors from the reclamation plant and land application would occur. The additional pipeline length could increase the potential for odor generation, particularly during warm weather periods. However, much of the alignment would traverse undeveloped areas along the BPA right-of-way. Expansion of the NB/CI reclamation facility could create a higher potential for odor from the reclamation facility. Similar to the new facility described in Alternative 1, all odor creation at the NB/CI site would be minimized through proper facility design and maintenance. There would be no significant long-term operational impacts from the operation of Alternative 2. As described for Alternative 1, the land application of reclaimed water would not have any odor impacts, because of the low odor content in the reclaimed water and the remote location of the application area.

Alternative 3 – No Action

Under the No Action Alternative, no construction-related impacts to air quality would occur because no new reclamation facility would be constructed. Properly functioning on-site septic systems can emit detectable odors, and as on-site septic systems age, the probability of system failure increases. This could increase the potential for odor impacts.

Cumulative Impacts

The establishment of sewer service could facilitate development as is anticipated for the Belfair UGA within the Mason County Comprehensive Plan, potentially resulting in an increase in new construction and additional short-term impacts to air quality within the Belfair UGA. No significant cumulative impacts to air are expected.

Mitigation Measures

During construction of the water reclamation facility, pump stations, and conveyance force main, best management practices (BMPs) would be implemented to minimize impacts from fugitive dust and vehicle and machinery emissions. Construction-related BMPs used to minimize air impacts typically include cleaning vehicles, controlling dust, and covering stockpiled materials.

Under either of the action alternatives, mitigation measures to control air impacts would be considered and developed for each component of the water reclamation facility. Facilities will be designed and sited to minimize the potential for impacts to surrounding properties, particularly sensitive receptors such as schools or retirement centers. Odor minimization options typically used at water reclamation facilities include carbon filters, casings, and other odor elimination devices. Odor producing compounds such as hydrogen sulfide and organic compounds found in untreated wastewater could be reduced by chemical addition at the pump station. The headworks facility could include odor control measures such as venting or other odor removing techniques. All activities would be required to comply with local, state, and national air regulations, as enforced by ORCAA.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse air quality impacts are anticipated from the operation or construction of Alternative 1 or 2.

4.3 Surface Water

Described below are the regulations that apply to surface water resources of the project area, and the existing water quality of those resources. Figure 4.3-1 illustrates the major surface water bodies in the project area. Impacts of each of the proposed alternatives on surface water resources and water quality are discussed following this affected environment section. Groundwater is discussed in Section 4.4.

Affected Environment

Policies and Regulations

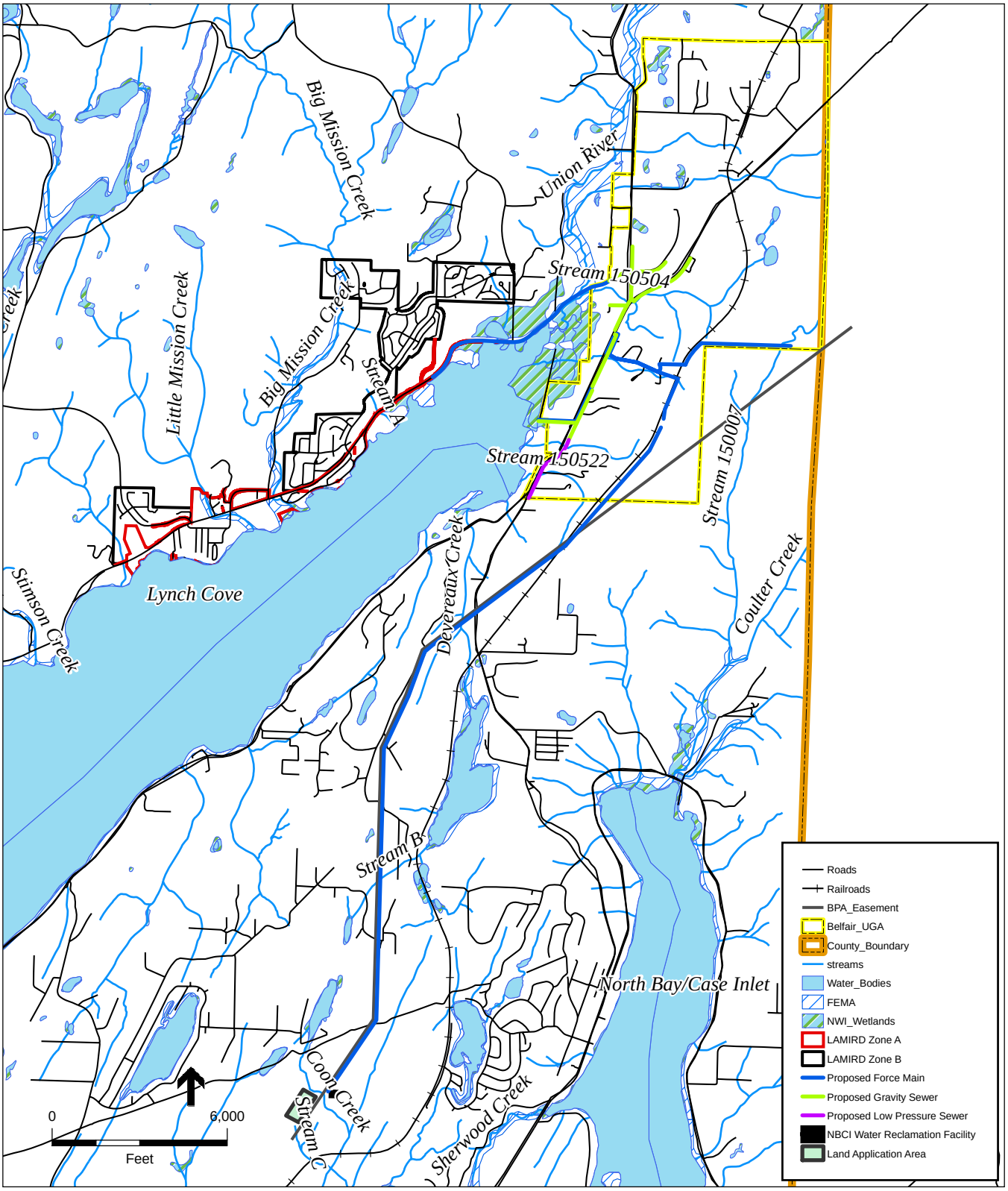
Activities involving surface water are subject to regulatory authority at the federal, state, and local levels. Discharges are subject to Washington State's anti-degradation policy, which dictates that the receiving water quality must maintain any beneficial uses it is currently serving, and that its quality cannot be degraded from its current condition (Chapter 173-201A-300 WAC). Discharge from a reclamation facility is regulated in accordance with applicable water quality standards as discussed below.

These and other relevant regulations are summarized in Table 4.3-1.

Table 4.3-1. Applicable Surface Water Regulations

Statute	Lead Agency	Regulated Activities
Clean Water Act (CWA) Section 404 (33 USC 1344)	U.S. Army Corps of Engineers– Seattle District	Discharge of dredged or fill material into waters of the U.S., including navigable waters and wetlands within Corps jurisdiction. Individual or nationwide permits are required, depending on project impacts.
Clean Water Act (CWA) Section 402 and Chapter 173-220 WAC	Washington State Department of Ecology (Ecology)	The National Pollutant Discharge Elimination System (NPDES) permit program oversees the discharge of pollutants and waste materials to surface waters of the state.
Chapter 173-201A WAC	Ecology	Water quality standards to protect beneficial uses of surface waters of the state. Any activity that could affect water quality is subject to these regulations.
90.4690.48, and 90.54 RCW *	Ecology	Reclaimed water and groundwater recharge standards.
Chapter 173-200 WAC*	Ecology	Water quality standards for groundwaters of the state of Washington.
79.90.10 RCW	Washington Department of Natural Resources (DNR)	DNR is responsible for managing publicly owned aquatic lands, and grants use authorization (easements or leases) for uses such as wastewater outfalls and stream crossings that affect public use of state owned aquatic lands.
Chapter 173-14 WAC and local shoreline regulations	Mason County	Activities within 200 feet of streams and river segments with a mean annual flow >20 cfs and associated wetlands.
Local regulations	Mason County	Sensitive areas review, such as streams and wetlands, must be conducted to determine the classification of the resource, probable impacts, and appropriate mitigation measures.

* Groundwater standards are included because land application of reclaimed water would need to meet these standards. Refer to Section 4.4, Groundwater, for additional discussion.



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 4.3-1

Belfair/Lower Hood Canal Water Reclamation Facilities

Hydrology, Wetlands and Flood Zones

Marine Water Resources

Two general marine zones have been evaluated as part of this analysis, Hood Canal/Lynch Cove and North Bay/Case Inlet. Following is a discussion of oceanographic characteristics and water quality considerations.

Water Circulation

Hood Canal/Lynch Cove. Hood Canal is a hook-shaped, 60-mile-long glacially carved fjord. It varies in depth from shallow tide flats to more than 600 feet deep. At its inlet, a sill transects the canal at a depth of about 150 feet. Hood Canal receives freshwater drainage from five major rivers including the Skokomish, Duckabush, and Dosewallips Rivers. The Lower Hood Canal watershed is located almost entirely in Mason County, with a portion in western Kitsap County. In Lower Hood Canal, the major freshwater sources are the Union, Tahuya, and Dewatto Rivers. Several small streams drain directly to the southern hook from a narrow watershed that parallels its most southerly shoreline.

In fjords such as Hood Canal, water circulation is often torpid. The water column can become stratified and lead to the natural condition of low dissolved oxygen concentrations in bottom waters. Unlike many fjords with shallow sills, the bottom waters of Hood Canal are not completely anoxic because cold, saline (and hence more dense), oxygenated ocean water sinks to the bottom as it spills over the sills and enters the fjord, flowing southward, while less dense fresh waters flow north and out of the canal. However, in the winter and spring, the flow of colder, less dense water into Hood Canal occurs at mid-depth. In late summer/early autumn, the major flushing event occurs, with the dense saline water displacing the existing bottom water (Paulson et al., 2006; Fagergren et al., 2004). The origin of this high-salinity water is the upwelling off the Washington coast and propagation of these waters through the Straits of Juan de Fuca into Puget Sound and Hood Canal. Estimates of the volume transport of deep waters into Hood Canal correspond to residence times of one to four months for the deep waters in Hood Canal (Warner et al., 2001). Lynch Cove is a large estuary that receives freshwater inputs from the Union River and several stream systems. It is primarily a mud flat surrounded by estuarine intertidal wetlands that progress upland to Palustrine type wetlands. Water circulation within Lynch Cove is limited. The water column of Hood Canal shallows to a depth of less than 50 meters as Hood Canal turns sharply at The Great Bend and enters Lynch Cove. Both tidal currents and the net estuarine circulation decrease landward of The Great Bend. The loss of turbulent energy from tides allows thermal heating and the supply of fresh water to maintain a stratified upper layer in the summer in Lynch Cove (Paulson et al., 2006).

North Bay/Case Inlet. Case Inlet is one of the seven waterways known as finger inlets, including Hammersley, Totten, Eld, and Budd Inlets, inland of Devils Head. North Bay lies at the head of Case Inlet, approximately 150 miles from the Strait of Juan de Fuca, and receives limited flushing from tidal action. Several small streams drain into North Bay, including Coulter Creek and Spring Creek (Water Resource Inventory Area (WRIA) 15), and Sherwood Creek (WRIA 14).

Very little information on circulation in Case Inlet is available. In general, circulation in south Puget Sound is driven by estuarine processes, where freshwater flow mixes with marine waters, causing the near surface water to move seaward over many tidal cycles. Density differences

between the near surface and the deeper, saltier water cause the deeper water to have a net landward movement, thus maintaining the salinity balance of the inlet. Often there is little vertical mixing between the layers, but strong currents, winds, and depth differences among basins can induce mixing. Physical modeling of the finger inlets showed that water moved from Totten Inlet through Pickering Passage and into upper Case Inlet over several tidal cycles, whereas waters from Budd Inlet moved through Dana Passage into lower Case Inlet (Ebbesmeyer et al., 1998).

Water Quality

Water quality standards for surface waters of the State of Washington have been developed consistent with "public health and enjoyment thereof, and the propagation and protection of fish, shellfish, and wildlife" (Chapter 173-201A WAC). The water quality standards have been established with regard to present and potential water uses and the natural water quality potential, and in consideration of limitations of those surface waters. Under the existing surface water quality regulations, Hood Canal is designated Class AA (extraordinary), and North Bay/Case Inlet is designated Class A (excellent) waters (Chapter 173-201A WAC).

The Washington Department of Ecology (Ecology) lists the status of water quality in water bodies throughout the state. Impaired water bodies are identified and included in a list referred to as the 303(d) list. Portions of the surface waters within the study area are included on Ecology's 2004 303(d) list of impaired water bodies for dissolved oxygen, fecal coliform bacteria, and pH. Lynch Cove is on the 303(d) list for fecal coliform bacteria and dissolved oxygen. North Bay is on the 2004 303(d) list for fecal coliform.

The deep marine waters of Hood Canal have a long history of low dissolved oxygen concentrations during the late summer. The concentration of dissolved oxygen present in Hood Canal's marine waters has been measured since the 1950s, and regularly since the early 1990s, by the Washington Department of Ecology Marine Waters Monitoring Program and the University of Washington. The stratification of a less dense, fresh upper layer of the water column causes the cold, saltier lower layer of the water column to be isolated from the atmosphere in the late summer and autumn, which limits aeration of the lower layer (Paulson et al., 2006). Available data suggest that even though dissolved oxygen concentrations vary from year to year, recent dissolved oxygen levels have been more frequently low, and the duration of low concentrations is more persistent (Frans et al., 2006). Other indicators of worsening conditions include the movement of mobile marine animals from their normal habitats, and periodic die-offs of fish and other marine animals.

As previously noted, Lynch Cove is an area of limited circulation, as well as current water quality impairment relating to fecal coliform bacteria and dissolved oxygen. Nutrient contributions, particularly nitrogen, have been identified as substantial contributors to low dissolved oxygen. Recent improvements to Belfair State Park included adding a pretreatment system to the existing wastewater treatment system, and upgrading utility hookup sites in the campground. These park upgrades have helped to reduce fecal coliform levels in Lynch Cove.

Prior to the 2002 construction of the North Bay/Case Inlet water reclamation facility in Allyn, failing septic systems in the communities of Allyn, Victor, and along the surrounding shoreline of North Bay were considered to be the primary contributors to the high bacterial levels. These

were attributed to poor soils, small lot sizes, poor original septic system design, high groundwater tables, and stormwater especially in shoreline areas (Dougherty, 2005). The results of these studies led the Washington Department of Health to restrict shellfish harvest in North Bay/Case Inlet, as discussed in Section 4.7, Shellfish Resources.

Total Maximum Daily Loads. Section 303(d) of the Clean Water Act mandates that Washington State must establish Total Maximum Daily Loads (TMDLs) for surface waters that do not meet water quality standards after application of technology-based pollution controls. At the time of preparation of this document, there is no TMDL in place or under development for any portion of Hood Canal or Case Inlet (WDOE, 2006). A TMDL has been developed for the Union River for fecal coliform (WDOE, 2001).

Potential Sources of Contamination

In Hood Canal, organic matter produced in the surface layer settles to the deeper portions of the water column. As this matter decomposes, it consumes dissolved oxygen. Production of this organic matter, which is typically in the form of phytoplankton, is limited by nitrogen levels in the surface water. Paulson et al. (2006) found that 92 percent of total nitrogen came from surface and groundwater from the surrounding subbasins, and that shallow shoreline septic systems contributed less than 4 percent of the nitrogen load to the upper layer. However, in Lynch Cove, the relative contribution of nitrogen from shallow shoreline septic systems to the upper layer was as high as 23 percent due to net transport of marine waters into the cove. Nitrogen in the saline water flowing over the sill into Hood Canal from Admiralty Inlet was at least 17 times the total load to the upper layer of Hood Canal.

The Hood Canal Low Dissolved Oxygen Preliminary Assessment and Corrective Action Plan (PACA) (Fagergren et al., 2004) examined the human activities that potentially supply nutrients to the marine waters and sought to quantify and rank their importance in order to prioritize early remedial efforts. Of the six major categories identified, human sewage ranked highest. On-site sewage systems (septic systems) predominate in the Hood Canal watershed. Use of a well-maintained septic system results in effective reduction of biochemical oxygen demand (BOD), bacteria, and pathogens, but most are not designed to effectively reduce nitrogen. It has been estimated that nitrogen leached from on-site sewage systems contributes between 33 and 84 percent (39 and 241 tons) of all human-caused nitrogen entering Hood Canal. Past surveys along the shoreline of Lower Hood Canal found that as many as one-third of the on-site sewage treatment systems were failing or suspect, resulting in increased fecal coliform in this area, closure of shellfish harvesting areas, and declaration of a public health emergency (Fagergren et al., 2004).

The Hood Canal Dissolved Oxygen Program's (HCDOP) Integrated Assessment and Modeling Study is a three-year study to determine the sources of low dissolved oxygen in Hood Canal and its interaction with marine life to support use in potential TMDL integration. The HCDOP also found that surface salinity, high salinity associated with low dissolved oxygen in Hood Canal, was associated with wind direction.

A recent study by the U.S. Geological Survey (USGS) identified several sources for the low dissolved oxygen conditions, including ocean water flowing into the canal which is high in nitrogen, poor circulation within the canal itself, increased water temperatures, and nitrogen

inputs from streams, septic systems, stormwater runoff, and decaying salmon carcasses. Other potential sources include global warming and current timber practices. An oversupply of nutrients, especially nitrogen, causes algae to bloom. Seawater flowing from Puget Sound contains 17 percent more algae-feeding nitrogen than all freshwater inputs combined. When algae die, they sink to the bottom and decay, removing oxygen from the water. The low dissolved oxygen conditions are generally highest near the bottom layer of water, and this is when bottom-dwelling fish, such as rockfish and lingcod, are at a high risk. If the wind picks up, the oxygen-depleted water mixes and many fish can die (USGS, 2006).

While the USGS study noted that Puget Sound water is the largest source of nitrogen, freshwater sources are also important. Approximately 92 percent of the total freshwater load of dissolved nitrogen comes to the upper layer of Hood Canal from surface and groundwater sources. Point sources and flow from shoreline septic systems contribute approximately 4 percent of the total freshwater load (USGS, 2006). This study does not identify the sources of nitrogen to surface and groundwater sources, so it is not clear what percentage of this loading is derived from on-site systems. Additional site-specific studies are needed to determine the relative contribution of nitrogen sources in Lynch Cove, and the complicated effects caused by wind and by inflows of water from Puget Sound.

Stormwater runoff, chum salmon carcasses, and agricultural practices have a smaller but important contribution to the nitrogen levels. Stormwater runoff is associated with development and impervious surfaces such as roads, rooftops, and parking lots. The volume and quality of stormwater runoff are affected by the amount and intensity of rainfall; the amount, location, and connectivity of impervious surfaces in the watershed; the use practices, soil type and infiltration rates; and topography and vegetation cover. Stormwater treatment and flow attenuation are achieved through the use of best management practices (BMPs) such as grassy swales, detention/retention ponds, infiltration basins, constructed wetlands, and engineered structures such as vaults and oil/water separators. These stormwater BMPs have generally been designed to reduce chemical pollutants, sediment, peak flows, and flow durations during and immediately after rain events, but do not necessarily reduce nitrogen concentrations in stormwater (Fagergren et al., 2004).

Freshwater Resources

Union River

The Union River and its tributaries drain approximately 23 square miles (14,500 acres) of land in Kitsap and Mason Counties, and flow into Lynch Cove at the southeastern end of Hood Canal, near the town of Belfair. The largest tributaries to the river are the Northeast Fork, Bear Creek, Hazel Creek and Courtney Creek.

The headwaters of the Union River are located roughly 5 miles west of Bremerton near the 1,760-foot-high Gold Mountain. Elevations are generally higher in the western half of the basin and most of the tributaries such as Hazel Creek, Bear Creek, and Courtney Creek originate in this area. Although the river gradients are high in the western headwaters area, the mainstem is mostly a broad river valley with stream gradients near 3 percent. Basin soils consist of a highly erodible mix of glacial outwash silt, sand, and gravel. Because of the low stream gradient in the

lower river basin within the project vicinity, the river has only minor erosion problems. Most eroded material is deposited near the river mouth as alluvial floodplain and mudflat sediments.

The river and tributary corridors in the upper watershed are all forested, and access to these areas is restricted to protect the City of Bremerton's Union Reservoir that provides the domestic water supply for Bremerton and the surrounding communities. The only activity the City of Bremerton allows in the protected area is managed forestry (Cahall, 2002). The McKenna waterfall located at river mile 6.71 restricts fish passage; however, the lower miles of the system are highly productive, supporting populations of coho and chum, and to a lesser extent, Chinook. Steelhead and cutthroat trout are also present in the system (CTC, 2000).

The lower reaches of the Union River flow through a broad valley dominated by moderately intensive mixed urban and residential land uses including Belfair. The majority of small farms in the area are located in this broad valley. The Riverine and Palustrine wetlands associated with the lower reaches of the mainstem and east fork of the Union River comprise a large portion of the priority habitat for overwintering waterfowl identified by WDFW (2006).

Flooding in the region generally occurs from November through April, caused by heavy rainfall. The Mason County Flood Insurance Study lists areas in the Lower Hood Canal Watershed as most susceptible to flooding, including the lower reaches of the Union River (Mason County 2005).

Water Quality. The entire Union River system is classified as Class AA waters (WAC Chapter 173-01A). The Washington Administrative Code (WAC) specifically designates Union River and tributaries from the Bremerton Waterworks Dam (river mile [RM] 6.9) and above to the headwaters as Class AA with the special condition of no waste discharges permitted. Hood Canal (Lynch Cove) is also designated as Class AA, and since the Union River is a tributary to Hood Canal and the WAC designates all unclassified surface water tributaries to Class AA waters as Class AA, all of the union River below the Bremerton Waterworks Dam is also Class AA. The characteristic beneficial uses and the fecal coliform water quality criteria for this classification are listed below:

Characteristic uses shall include, but not be limited to, the following [WAC 173-201A-030(1)(b)]*:*

(i) Water supply (domestic, industrial, agricultural).
(ii) Stock watering
(iii) Fish and shellfish
(iv) Wildlife habitat
(v) Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).
(vi) Commerce and navigation

Water quality criteria [WAC 173-201A-030(1)(c)(i)(A)]*:*

(i) Fecal coliform organisms:
(A) Freshwater – fecal coliform organism levels shall both not exceed a geometric mean value of 50 colonies/100 mL and not have more than 10

percent of all sample obtained for calculating the geometric mean value exceeding 100 cologine/100 mL.

Water quality sampling of the Union River since 1990 has shown that fecal coliform bacteria levels at several sampling locations exceed Washington State's Class AA standard of 50 fecal coliform colonies/100 milliliters (mL), resulting in the listing of the lower mainstem of the Union River on both the state's 1996 and 1998 Section 303(d) lists for fecal coliform (Sweet et al. 2002). Portions of shellfish beds in Lynch Cove adjacent to the mouth of Union River have been closed starting in 1987 due to fecal coliform bacteria contamination. Mason County Department of Health Services (MCDHS) has created a shellfish protection district and programs as required by RCW 90.72.045 to address the shellfish closure problem. MCDHS initiated water quality sampling and sanitary surveys to track sources of fecal coliform in Lynch Cove in the early 1990s. They sampled the lower Union River at the bridge of Highway 300 between August 1990 and August 1991 and found fecal coliform excursions above the Class AA standard. These data resulted in listing the lower mainstem of the Union River on both the state's 1996 and 1998 Section 303(d) lists for fecal coliform. Ecology's Environmental Assessment Program and Bremerton-Kitsap County Health District (BKCHD) have also collected data since this time showing that the Union River exceeds fecal coliform standards at several sampling stations in the watershed. Excursions were found at stations from the mouth of Union River to RM 4.5 at the Kitsap/Mason County line and in the Bear Creek tributary.

Lynch Cove, which is a commercial shellfish harvest area and one of the state's largest recreational shellfish areas, is on the 303(d) list for fecal coliform at the mouth of the Union River and at four more locations along the North Shore. The Union River is one of many contributors of bacteria to Lynch Cove. Other potential sources include shoreline residences, stormwater, boat wastes and wildlife. Shellfish are filter feeders that pump large amounts of water through their bodies. This process can concentrate bacteria in their tissues, which causes little or no harm to the animal, but may pose health risks for human consumers. As mentioned above, portions of shellfish beds are closed to harvest. Therefore, reductions in fecal coliform inputs into Lynch Cove from the Union River would benefit water quality conditions in the Cove.

Several local agencies have plans or existing programs to address the bacteria problem in Union River. For example, the BKCHD initiated the Upper Union River Restoration Project in November 2001 to address pollution problems in the Kitsap County portion of the Union River. Mason Conservation District has initiated the Lower Union River Restoration Study to address pollution problems in the Mason County portion of the Union River. Outside of local government, several citizen groups, such as the Lower Hood Canal Watershed Implementation Committee (LHCWIC), are active in development and planning of activities to help reduce fecal coliform contamination in the Union River watershed.

With the implementation of these plans and programs the water quality in the Union River is improving. The interim targets for 90^{th} percentile bacterial samples are being met as low in the system as RM 4.0, with improvements found as far down as RM 1.8. Sites below RM 1.8 have yet to show improvement (Mann, 2005). Ecology anticipates that if these water quality programs and projects proceed as expected, by December 2007 all sampling stations within the Union River watershed will be within water quality standards for bacteria (Sweet, 2002). A portion of

the Hood Canal shellfish beds (122 acres) near the mouth of the Union River reopened in 2004 due to a reduction in fecal coliform levels.

Big Mission and Little Mission Creeks

Like the Union River, both Mission and Little Mission Creeks are classified as Class AA because they discharge into Hood Canal (WAC 173-01A-120). Their outlets are located along the North Shore at Belfair State Park within the area identified as LAMIRD Zone A. Belfair State Park occupies over 3,500 feet of Hood Canal shoreline, which extends into 62 acres of tidelands that support abundant shellfish (Scott, et al., 1986). There are four species of clams (littleneck, native littleneck, manila, and eastern softshell) along with oysters. Both streams flow into Hood Canal across tidal flats, Mission Creek along the eastern boundary of the park and Little Mission Creek through the center.

Big Mission Creek drains an area of 13.2 square miles and Little Mission Creek drains nearly 2.0 square miles. Both watersheds are heavily forested with low, rolling hills. Slopes are moderate to steep in the upper watershed and decrease to low gradient near the confluence. Both stream systems produce coho and chum salmon. Despite its small size, Little Mission Creek out produces both Mission Creek and Union River in fish production due to its relatively consistent flows and temperatures during low-flow periods (Barnes et al., 1995)

The most concentrated development is in the southern end of the watersheds near Belfair State Park within LAMIRD Zone A. Light recreation-related commercial activity is located next to the park. There is intensive residential use along the lower end of each main stream and nearby on the eastern boundary of Mission Creek. Agricultural activity is minimal in both watersheds, and logging is occurring in the central and upper part of the Mission Creek sub-watershed.

Water Quality. Ecology considers both of these Class AA watersheds as having water quality conditions of moderate concern. This ranking is based on sampling parameters defined by Washington State Water Quality Standards (WAC 173-201A).

In 1995, Ecology found that Mission and Little Mission Creeks were not important sources of fecal coliform bacteria to Hood Canal. Fecal coliform levels at all sampling stations were very low, and there was no significant difference between the streams for either fecal coliform levels or loadings. Neither were rain-event results significantly different from dry results. Sites downstream of developed stretches of the streams were not statistically different from either sites upstream of development or undeveloped tributaries.

However, sampling conducted by Ecology in 2002 and 2003 found that fecal coliform counts in Little Mission Creek exceeded the percentile criterion in both years (Hallock, 2005). Little Mission Creek was subsequently been placed on Ecology's 303(d) listing for 2004.

Coulter Creek

Coulter Creek flows south for approximately 8 miles from the headwaters in the lowland hills near Sunnyslope to North Bay, with several tributaries contributing an additional 10-12 miles of channel length and draining an area of 14.1 square miles (Haring, 2000; Williams et al., 1975). Most of this drainage, from just downstream of the west branch tributary to RM 5.9, is located

within the privately owned Overton Tree Farm. The upper portions of many of the tributaries are seasonal. Approximately half of the surface flow at the mouth of Coulter Creek originates as surface flow from Coulter Creek at the southern boundary (RM 0.6) of the Overton property, with the remainder contributed by tributary and groundwater flow downstream.

Coulter Creek has a moderate to shallow gradient with excellent quality spawning gravel (Williams et al., 1975). The creek supports coho, chum, and Chinook salmon in all areas with continuous flow, but the seasonal portions of the tributaries may support salmonids only during wet seasons when surface flows allow access (Williams et al., 1975, Haring, 2000). Pacific lamprey have also been found within the system (WDFW, 2006). Riparian conditions are generally considered good, with alder and confer-dominated buffers typically 35-75 feet wide. However, much of the standing and downed woody material has been removed from the riparian area for fire control (Haring, 2000). The Washington State Department of Fish and Wildlife operates a salmon hatchery at the mouth of the stream. An unnamed tributary (15-007) of Coulter Creek that joins the mainstem at RM 2.5 flows within 0.25 mile of the southeast portion of the discharge site for Alternative 1 (Williams et al., 1975).

Water Quality. Water quality data for Coulter Creek are not available. However, because of the undeveloped nature of the Coulter Creek watershed, it is anticipated that water quality in the stream would be good.

Potential Sources of Contamination

Commercial and Residential On-site Sewage Systems. The on-site sewage systems located within the Union River, Big Mission, and Little Mission Creek basins can be a source of pollutants if they are substandard, failing, or located adjacent to a water body. Approximately a tenth of the Union River watershed and significant portions of the Big Mission and Little Mission watersheds are used for residential properties. Potential sources of bacteria, nutrients and other contaminants include sewage from failing residential on-site sewage systems, inadequate community wastewater treatment systems, and accidental spills or illegal dumping from sewage collection.

Graywater is also a potential source of bacteria and other contaminants. Graywater is wastewater from bathtubs, showers, bathroom sinks, washing machines, dishwashers and kitchen sinks. The Washington State Department of Health (DOH) regulates the use of graywater for subsurface irrigation. DOH stresses that graywater can contain harmful bacteria, viruses, and chemicals that pose a risk to public health and the environment if mishandled. Graywater cannot be discharged to the ground surface or surface water in Washington State. A wastewater permit must be obtained from a county health agency in order to use graywater for subsurface discharges. According to Bremerton-Kitsap County Health District, graywater discharges to Union River have been detected.

Urban and Semi-urban Stormwater Runoff. Insufficient stormwater control and treatment can cause excessive sedimentation and erosion, increased stream temperatures, and decreased dissolved oxygen levels. It can introduce bacteria, toxic chemicals, metals and other contaminants into receiving waters. Pet wastes deposited on curbs and paved surfaces may enter surface waters as runoff during storm events and contribute to shellfish bed bacterial contamination and excessive nutrient pollution (Horner et al., 1994). Urban and rural

homeowners apply pesticides, fertilizers, and other chemicals to lawns and gardens that can be washed off when it rains. Belfair generates significant amounts of stormwater that ultimately reach Lynch Cove.

Small-scale Farming or Commercial Horticultural Activities. Small-scale farming and commercial horticulture typically involve fertilizers, pesticides, and animal wastes that can impact nearby water bodies. Removal of vegetative cover increases the rate and volume of runoff from sites, increasing the potential for erosion and sedimentation impacts to downstream water bodies. Homeowner use of fertilizers and pesticides can also impact water bodies. Runoff from feedlots and manure piles, common in many agricultural areas, can be significant sources of bacteria, nitrogen and phosphorus pollution to surface and groundwater. Bacterial pollution from farms is implicated in many shellfish bed closures around the country. Small-scale or hobby farms make up a significant portion of land in the lower valley of the Union River watershed.

Wildlife. Wildlife may contribute bacteria, nutrients, and particulate organic material to surface waters, occasionally in significant amounts. Decaying salmon carcasses are known to be significant contributors of nitrogen to Hood Canal.

Recreational Activities. Recreational activities, including boating, can result in pollutant inputs from petroleum products that spill or leak from boat motors, illicit dumping of human waste and litter, and other activities.

Wetlands

Wetlands in the project vicinity are described in detail in Section 4.5.

Impacts

Table 4.3-2 shows the surface water resources that may be impacted by construction and operation for each alternative.

Table 4.3-2. Proposed Facility and Infrastructure Locations and Nearby Surface Water Bodies

Proposed Facility and Infrastructure Locations	Nearby Surface Water Bodies
Alternative 1 – Reclamation Facility near Belfair	
Reclamation Facility	Coulter Creek; Stream (15-0007)
Conveyance Force Main	Stream (15-0007); Stream (15-0504); Stream (15-0503A)
Pump Station	Stream (15-0503A)
Land Application	Coulter Creek; Stream (15-0007)
Alternative 2 – Expansion of the NB/CI Reclamation Facility	

Reclamation Facility	Coon Creek: Stream (C)
Conveyance Force Main	Stream (15-0503A); Stream (15-0522); Devereaux Creek; Stream (B); Coon Creek; Stream (C)
Pump Station (s)	Stream (15-0503A); Stream (15-0522); Devereaux Creek; Stream (B); Coon Creek; Stream (C)
Land Application	Coon Creek: Stream (C)
Service Areas	
Belfair UGA	Union River; multiple tributaries
LAMIRD Zones A and B	Big Mission Creek; Little Mission Creek
LAMIRD Conveyance Force Main	Lynch Cove; Union River; Stream (A)

Alternative 1 – Reclamation Facility near Belfair

Construction Impacts

Impacts to Freshwater Systems. Short-term erosion is likely to occur in all areas of construction involving exposed soils. Eroded soils could enter surface waters, affecting water quality. The extent of erosion impacts would depend on the duration of construction, the extent of the area exposed, the type of soils exposed, and precipitation. Approximately 15 acres of currently vegetated area will be cleared for the construction of the reclamation facility and holding ponds. This site is relatively flat and does not have soils that are prone to excessive erosion (see Section 4.1, Earth Resources). Therefore, impacts to receiving water bodies are not expected to be excessive.

However, construction of the proposed reclamation facility and storage pond could result in some level of erosion and sedimentation to the unnamed tributary of Coulter Creek (15-0007). In several locations, the stream is within 100 feet of the proposed site. Appropriate measures designed to capture surface erosion, such as silt fences, will need to be used along the stream corridor to prevent impacts to water quality within the system.

The proposed reclamation plant site is largely composed of upland forest habitat and managed for commercial forestry purposes. There is little to suggest that contaminated soils or groundwater exist in the areas proposed for construction. There may be some levels or fertilizers or pesticides that have been applied in the past; site-specific studies conducted during facility design would determine if such compounds are present and if so, appropriate mitigation measures would be developed.

Leaks or spills of fuels, hydraulic fluids, and other substances used in construction equipment or vehicles could occur during construction. The potential for these types of spills is typical of any construction site and could result in contamination of surface and groundwater. However, the impacts would be limited to the volume of the device or piece of equipment containing the fluids. Because of the relatively flat topography at the site, it is likely that spills would be contained on-site prior to washing off-site in runoff.

Impacts to Marine Waters. No significant impacts to marine water resources are anticipated during construction of the reclamation facility. Anticipated impacts may include erosion resulting from soil-disturbing activities such as excavation and grading, thereby resulting in potential for sedimentation and turbidity via surface water runoff to streams and then the marine environment. However, due to the distance between the reclamation facilities, conveyance, and discharge areas and the marine environment, the implementation of construction best management practices (BMPs), and compliance with applicable permit requirements and conditions, theses impacts are considered insignificant in the short term.

Conveyance Force Main. Construction related impacts to surface water quality include potential sedimentation and erosion in adjacent surface water bodies (see Table 4.3-2). Increased turbidity and reduced dissolved oxygen levels in water bodies can be detrimental to water quality and, in turn, to fish and aquatic habitat. Stream and wetland crossings will be accomplished using technologies that avoid open trenching construction, thus reducing the potential for direct impacts to water quality. Trenchless construction techniques such as directional drilling and microtunneling, coupled with the implementation of construction best management practices, should help to substantially reduce the potential for impacts to water quality

The conveyance force main from the LAMIRD to the Belfair UGA will be located in the rights-of-way of SR 300 adjacent to Lynch Cove. Approximately two-thirds of a mile southwest of the Belfair UGA, an approximately 800-foot section of the conveyance force main will be constructed adjacent to both freshwater wetlands (north side of the road) and estuary habitat (south). Both areas are considered priority habitat for overwintering waterfowl (WDFW 2006). In this location, it will be important to employ every precaution to restrict erosion from leaving the site. A dewatering system will also need to be designed to avoid dewatering these adjacent water bodies. It will also be important to dispose of the dewatered flows in a manner that does not negatively affect water quality in receiving water bodies.

Dewatering along other sections of the conveyance line may also be required. All dewatering will be conducted in accordance with Department of Ecology requirements. Site-specific investigations will determine the need for dewatering, and if required, how this water would be disposed. In areas adjacent to streams or wetlands, additional steps may be needed to direct the water away from sensitive resources or provide treatment prior to discharge.

Pump Station. Construction-related impacts to surface water would be similar to those described for the reclamation facility, but of a lower magnitude because the construction footprint of the pump station site is estimated to be less that 0.1 acre.

Land Application. Construction activities in the land application area would be minimal, having relatively little impact to Coulter Creek and the unnamed tributary (15-0007). The irrigation system will include a valve vault, force main, pumps and header system, and overland high-density polyethylene (HDPE) laterals.

Service Areas. Pipeline construction within the service areas could result in impacts to adjacent surface water bodies, as described above.

Operational Impacts

Impacts related to the operation of the facility are primarily related to water quality. Under current conditions, the secondary treated reclaimed water would be spray irrigated to a forested area approximately 33 acres in size at an average rate of 0.61 inch per day. This is the estimated rate that would allow uptake of water and nutrients by the forest vegetation at the site. No discharge would occur to surface waters. The reclaimed water would be taken up by vegetation, evaporate, or infiltrate into subsurface soils or groundwater. The proposed treatment method, a Membrane Bioreactor (MBR), represents state-of-the-art treatment technology for treatment effectiveness. The MBR would meet treatment standards for Class A Reclaimed Water, which are outlined in Table 4.3-3.

Alternative 1 would reduce the current level of bacterial and nutrient inputs to the waters of Hood Canal (Lynch Cove) by connecting residences in the service area that are currently on septic systems to the proposed sewer system. Eliminating inputs from failing or poorly functioning septic systems will reduce sources of fecal coliform bacteria and nitrogen loading to these water bodies, which have areas of impaired water quality. Anthropogenic sources of nitrogen have also been linked to low dissolved oxygen levels and algal blooms in Hood Canal. Existing on-site systems in this area have been identified as having a detrimental effect on shallow groundwater and surface waters. In a study done for Mason County, Murray Smith and Associates (2006b) reviewed soil types and depth to groundwater in the area to predict suitability for on-site septic systems. The study identified the use of on-site septic systems in the nearshore area along the North Shore of Lynch Cove as having a “probable” likelihood of negatively affecting water quality in Lynch Cove (Figure 4.3-2).

Nitrogen is of particular concern because of its potential to enrich nearshore areas and result in oxygen depletion. Fecal coliform bacteria is also a parameter of concern because its presence indicates potential contamination by human waste. Properly designed and operated individual on-site systems are effective in removing bacteria; however, they are less effective at nitrogen removal. Given the density, soil type, proximity to surface water, and depth to groundwater of many of the existing septic systems along the North Shore area of Lynch Cove, these systems are seen as a highly likely contributor to the water quality problems in this area of Hood Canal.

Table 4.3-3. Water Quality Comparison

Type of Water	Description	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	Ammonia-N (mg/l)	Nitrates/ Nitrites - N (mg/l)	TKN (mg/l)	Fecal Coliforms (cfu/100 ml)
Blackwater	Residential wastewater from toilets, dishwashers, kitchen sinks and garbage grinder fixtures before any treatment occurs.	280	700	292	15	<2	76.5	10^6
Sewage	Typical residential combination of blackwater and graywater before any treatment occurs.	200	500	200	12	<1	45	10^6
Graywater	Residential wastewater from showers, bathtubs, washing machines and bathroom sink fixtures before any treatment occurs.	120	300	108	1	<0.2	26	10^6
Septic Tank Effluent	Settled and skimmed sewage exiting septic tank before entering drainfield.	160	400	120	27	1	45	10^6
Municipal Stormwater	Rainwater runoff from roofs, parking areas and lawns.	50	100	100	10	10	25	$<10^6$
Typical Wastewater Reclamation Facility Effluent	Biological nutrient removal, secondary effluent that has been UV disinfected.	3	26	6	0.2	2	4	<200
Typical Lake Water	A suburban area lake suitable for recreational uses, including swimming.	2	6	10	<0.1	2	4	20
Class A Reclaimed Water	Biological nutrient removal, secondary effluent that has been filtered and disinfected.	3[b]	6	3	2	2	6	<2.2
Municipal Potable Water	Water which meets state and federal standards for routine human consumption.	<1	<1	<1	<0.1	<5	<6	<2.2

[a] Actual values will vary. Values shown in the table represent mean concentrations.
[b] Regulatory limit is 20 mg/l, however, 0.5 NTU regulatory limit effectively reduces the concentration

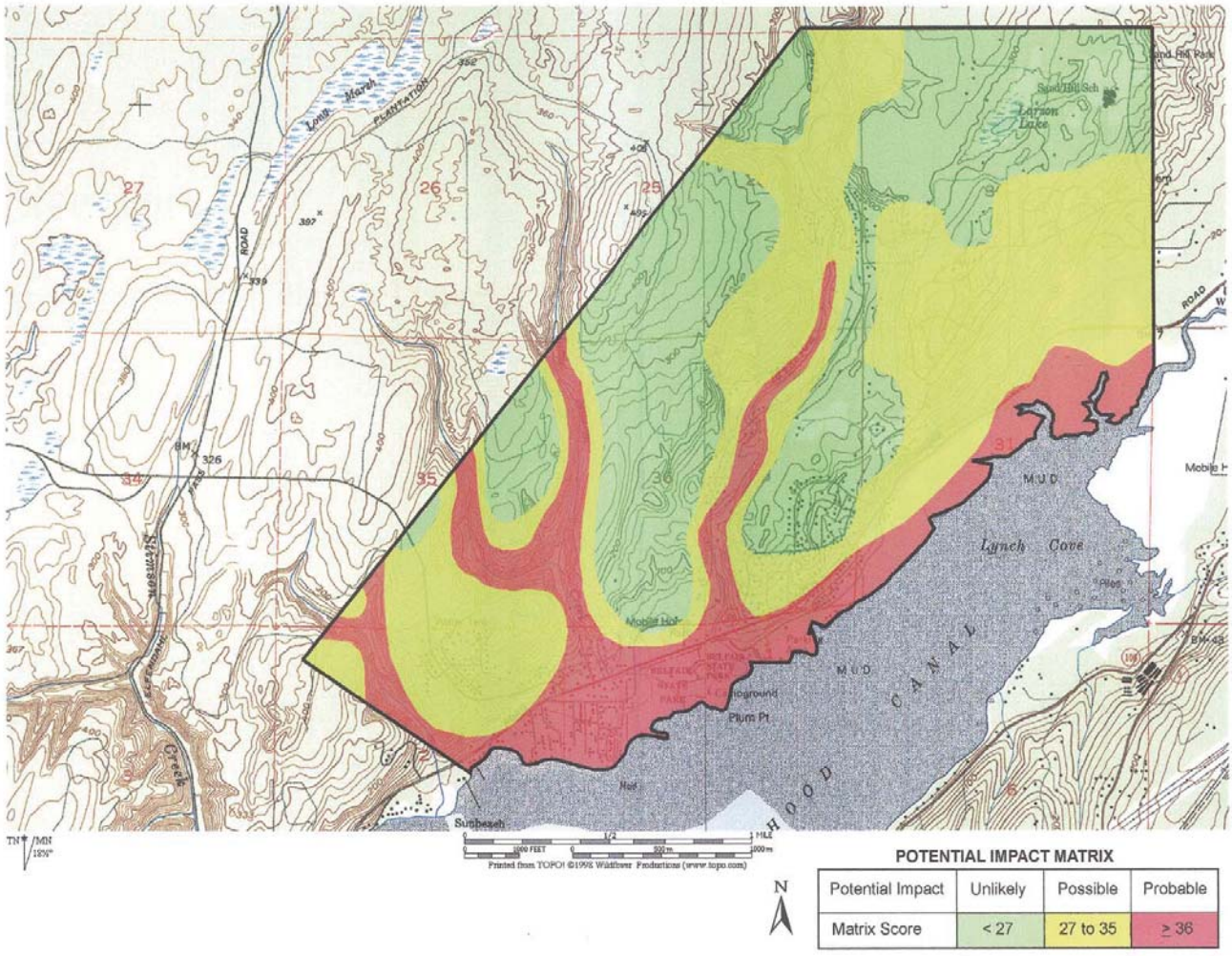


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Figure 4.3-2

Belfair/Lower Hood Canal Water Reclamation Facilities

Potential Impact to Hood Canal from On-site Septic System

Conventional, individual septic systems have not been shown to be effective at nitrogen removal. Ranges of total nitrogen in septic tank discharge can range as high as 60 mg/L. Many studies cite total nitrogen ranges between 25 mg/L and 60 mg/L. Bacteria concentrations are effectively removed in a well functioning drainfield (Metcalf and Eddy, 2003); however, bacteria removal rates can be negligible in failing systems. Failing systems are those systems that are not functioning properly due to poor soil conditions, excessive hydraulic loading, or other conditions that reduce the treatment capability within the soil column. Because current information indicates that failing systems are contributing to water quality problems in the Lynch Cove/North Shore area, it appears that continued use of on-site systems as they are currently operated would continue to affect groundwater quality and adjacent surface water bodies. Additional site-specific information will be needed to specifically address site constraints related to nitrogen transport. The general zones identified in Figure 4.3-2 illustrate the areas of highest potential to contribute to surface water problems in Lynch Cove. Elimination of these inputs is anticipated to result in water quality benefits, but water quality monitoring will be needed to determine how substantial these benefits will be.

Development and redevelopment within the UGA at urban densities and intensities will occur as wastewater service is provided to the UGA. This level of density is higher than what could occur using on-site septic systems for wastewater disposal, but would take place at levels adopted by Mason County for Belfair. In the LAMIRD Zones A and B, any new development or redevelopment would have to be consistent with the existing Comprehensive Plan and Mason County Zoning Ordinance for density and lot size requirements. The sewer availability would not enable increased density over that which could occur at present. While reductions in pollutant loading to surface waters will occur from elimination of failing septic systems, there will be an increase in pollutant loading from non-point sources accompanying development. Mason County is currently developing regulations for stormwater management within the Belfair UGA and the LAMIRD to manage these inputs to appropriate levels.

The discharge of reclaimed water to the sprayfield could also help to increase base flows in the unnamed tributary to Coulter Creek, which feeds into North Bay. Additional study will be needed to determine if any augmentation of base flows would occur, and whether any benefits to base flows during summer months would result. Increased flow during this period could help maintain stream temperatures and adequate dissolved oxygen levels.

An area that will require additional evaluation is the potential impact resulting from out of basin transfer of flows generated in the Hood Canal drainage basin to the Case Inlet drainage basin. This transfer could have a localized impact on groundwater inputs to the nearshore areas within the Belfair UGA and LAMIRD. However, this out of basin transfer would also provide beneficial impacts to water quality by decreasing nutrient and bacterial concentrations in the lower reaches of the Union River and Lynch Cove, as described above.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Described below are the construction-related and operational impacts associated with the implementation of Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility.

Construction Impacts

Construction impacts for Alternative 2 would be similar to those discussed for Alternative 1. Alternative 2 would require nearly 33,000 feet of force main pipeline, and the construction of an additional conveyance pump station. These activities would require more soil disruption and could potentially provide a greater source of erosion and sedimentation.

The conveyance force main will cross a total of five streams between the Belfair UGA service area and the NB/CI facility. Stream crossings should be constructed in the manner described in Alternative 1.

Operational Impacts

Operational impacts would be similar to those of Alternative 1, including potential impacts from development or redevelopment within the LAMIRD, with the exception that the spray irrigation of reclaimed water would occur over a 51-acre area at a rate of 0.61 inch per day. In addition, the reclaimed water could provide improved water quality for the unnamed stream adjacent to the land application site, a tributary to Sherwood Creek that eventually discharges into Case Inlet just south of Allyn. Additional site-specific studies will be necessary to determine whether any augmentation of base flows and improvements in water quality would occur.

Alternative 3 – No Action

Under the No Action Alternative, loadings to surface water resources would continue as they currently occur. Continued reliance on on-site septic systems could lead to increased levels of nutrients, bacteria, and other chemicals reaching area surface waters as these systems age and become more susceptible to failure. The increased level of pollutants from on-site septic systems could adversely affect marine surface water resources in the Lynch Cove/Hood Canal or North Bay/Case Inlet drainage areas. Bacterial loadings from individual systems would continue, and could increase as existing systems age and are unable to be effectively maintained or repaired. Nutrient loading, particularly nitrogen loading, would continue unabated and could potentially increase as remaining parcels develop as allowable under existing on-site requirements.

Because the Belfair UGA would remain without sewer service, bacterial and nutrient loading to the shallow groundwater system would continue as it currently occurs. Additional development would occur as allowed by on-site system regulations. Development would occur at a lower density than would occur with a centralized sewer system. However, much of the development that occurs would likely fall below the threshold requiring stormwater management. Thus, stormwater inputs would be expected to increase. Mason County is currently in the process of developing a stormwater management program for the Belfair UGA, to address the specific issues associated with development in this area. This plan would need to incorporate the issues associated with stormwater if sewer service is not provided within the Belfair UGA.

Cumulative Impacts

With the establishment of wastewater service, the Mason County Comprehensive Plan would be implemented within the Belfair UGA, which would result in an almost immediate increase in new construction and ultimately an increase in impervious surface area within the basin. Future

development of the UGA could result in additional erosion and accidental spills from construction equipment, as well as loss of habitat, which could impact marine surface water resources by further degrading water quality. The proposed reclamation facilities are expected to result in water quality improvements by reducing fecal coliform and nitrogen inputs; the additional development of areas within the UGA may introduce new sources of pollution from roadways, homes, and businesses.

If the No Action Alternative is implemented, cumulative impacts from low-density "sprawling" development could occur, as development occurs at a rate allowable for septic systems. Inputs from stormwater as well as failing or malfunctioning septic systems could contribute to continued water quality degradation in Lynch Cove that would worsen over current conditions. Conditions would be expected to be most deleterious in the North Shore area.

Mitigation Measures

Construction

Erosion and sedimentation controls to minimize the impacts resulting from the reclamation facility construction are described in Section 4.1, Earth. The following measures could also be used to minimize erosion:

- Develop and implement comprehensive erosion and sediment control plans for each phase of construction in accordance with the Washington State Department of Ecology's *Stormwater Management Manual for Western Washington* (O'Brien, 2005). The plans could include elements for site stabilization, slope protection, drainageway protection, and sediment retention.
- Where possible, perform construction during the dry summer months to minimize the potential for sediment-laden runoff to enter surface waters.
- Spill and erosion prevention and sediment control plans, as well as observance of all applicable safety and environmental regulations for handling chemicals, would be in place to minimize risks.

The following measures could be used to minimize impacts of dewatering during construction:

- Meet Ecology water quality standards for discharge to stormwater drainage ditches, infiltration trenches, or groundwater during construction to minimize the potential for impacts to either surface or groundwater quality. Obtain approval from the Washington Department of Fish and Wildlife for discharge to stormwater drainage ditches.
- To minimize turbidity, route all water from dewatering operations through sediment removal facilities as needed prior to eventual discharge either to infiltration trenches or designated receiving water bodies. If dissolved oxygen were found to be low, aerate the water prior to discharge into any surface water body. Discharge of dewatering water would comply with construction NPDES standards and permit requirements.
- Control the release of construction dewatering water into nearby surface water bodies to minimize erosive velocities and the potential for erosion, turbidity increases, and sedimentation.

Operation

In accordance with Ecology's requirements for land application of reclaimed water, water quality would be monitored for compliance with all applicable standards. Highly treated water discharged from the reclamation facility would be strictly regulated by Ecology through the facility's State Waste Discharge operating permit. Development of these permit conditions would be in accordance with state water quality standards, which have been developed to ensure that the beneficial uses of the receiving waters are maintained to protect human health and welfare, in addition to protecting aquatic life. Compliance with the permit conditions would ensure that no significant impacts to water quality would occur. Table 4.3-3 summarizes applicable water quality standards for land application of reclaimed water.

Water quality monitoring and reporting would be conducted in order to ensure that the discharge of highly treated water meets or exceeds all water quality standards. This monitoring would include effluent monitoring, and monitoring of the groundwater underlying the spray irrigation field. Water quality monitoring could include sampling for other chemical pollutants of concern, such as endocrine disrupting chemicals, in addition to parameters required for permit compliance.

The reclamation facility would be designed to meet the reliability and redundancy standards required for the plant operation as required by Ecology.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to surface water resources are anticipated, however, continued monitoring of water quality conditions in surface water bodies will be needed to ensure that any trends toward water quality degradation are identified and addressed. Contributions from wastewater represent a portion, but not the entirety, of pollutant loading to the surface water resources in the area.

4.4 Groundwater

Affected Environment

The Washington State Department of Ecology (Ecology) regulates groundwater quality under the Water Quality Standards for Groundwaters of the State of Washington (WAC 173-200). WAC 173-200 lists maximum contaminant concentrations for a wide range of groundwater quality parameters and also provides for an anti-degradation policy that prohibits groundwater contamination. Land application from the proposed facility must comply with Ecology's groundwater recharge standards (90.46, 90.48, and 90.54 RCW), 1997 Water Reclamation and Reuse Standards, and Washington State regulations (WAC 173-200 and 173-154).

Water Reclamation and Reuse Standards

The water reclamation and reuse standards were developed in accordance with RCW 90.46 (Reclaimed Water) (Washington State Departments of Health and Ecology, 1997). The standards require that reclaimed water must be reliably generated. Emergency storage or alternate discharge locations must be provided for reclamation facilities. The standards also require automated alarms, redundancy of treatment units, and stringent operator training and certification to meet the reliability criteria.

Four classes of reclaimed wastewater are recognized under the standards: A, B, C, and D. These classes are differentiated by the extent of disinfection and the potential use. Class A reclaimed waters are subject to the most stringent requirements and are described in the standards as follows:

> ". . . [water] that, at a minimum, is at all times an oxidized, coagulated, filtered, and disinfected wastewater. The wastewater shall be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of total coliform organisms does not exceed 23 per 100 milliliters in any sample."

The standards permit surface percolation of reclaimed water for groundwater recharge provided the reclaimed water meets "groundwater recharge criteria" as measured in the groundwater beneath or downgradient of the recharge project site. Groundwater recharge criteria are the contaminant criteria found in the drinking water standards adopted by the State Board of Health pursuant to Chapter 43.20 RCW and the Washington Department of Health pursuant to Chapter 70.119A WAC.

Treatment requirements for surface percolation of reclaimed water include the following:

> "The minimum pre-treatment for ground-water recharge shall be Class A reclaimed water to ensure significant pathogen reduction, and . . .
>
> The secondary treatment process used to provide oxidized wastewater shall include an additional step to reduce nitrogen prior to final discharge to groundwater."

Prior to implementation of a land application area as a recharge facility, further studies would be needed to determine long-term infiltration rates, groundwater discharge boundaries, proximity to public wells and critical aquifer recharge areas, susceptibility of underlying aquifers tapped by public water systems, and the potential for flooding or land slumping due to raised groundwater tables.

Existing Groundwater Resources

The definition of aquifer recharge areas according to WAC 365-190-030 is: "Areas with a critical recharging effect on aquifers used for potable water are areas where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water." Groundwater provides virtually all of Mason County's potable water (Mason County, 2005). Precipitation is the primary source of recharge for Mason County's groundwater. Precipitation within the county averages 64 inches annually (Mason County, 2005).

Water levels in wells in the area are typically within 125 feet of the land surface (Gray and Osborne, 2003). The quality of the groundwater in an aquifer is linked to its recharge area. Mason County mapped critical aquifer recharge areas in 1996 and included this mapping in their Comprehensive Plan (Mason County, 2005). As shown on Figure IV-4.5 of the Comprehensive Plan, portions of the Belfair UGA are designated highly critical aquifer recharge areas. Protection of critical aquifer recharge areas is provided according to Mason County Resource Ordinance 17.01.080.

As noted in the December 2003 Water Reclamation Facility Plan Amendment, Lower Hood Canal from Belfair to Union and Tahuya has approximately 51 water system purveyors. In addition, a number of private wells are located throughout the county. As noted in the Water Reclamation Facilities Plan (amended December 2003), one well exists within the Belfair UGA, and two wells are located outside the UGA boundary. No wells are present in or near the proposed land application area (Gray and Osborne, 2003). Water service within the Belfair UGA is provided by a community water system. Within the LAMIRD, water is provided by a combination of individual wells and a community water system.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Construction impacts to groundwater largely relate to the need for dewatering. The amount of necessary groundwater withdrawals and the disposal method would be determined during final design. Specific information regarding the method of groundwater control, the volume of groundwater discharge, and the discharge location is not available at this time. Prior to any construction activity, site-specific explorations would be conducted to determine the appropriate control method and discharge location. The dewatering system would be adjusted to pump only the minimum quantities necessary to construct the facility or pipeline. Dewatering volumes

could be discharged to storm drainage ditches, into an infiltration trench, or reinjected into the ground at some distance from the excavation area. The disposal method would be selected based upon dewatering volumes, subsurface conditions, groundwater quality, and location of excavation.

Because of historical land uses and existing timber stands, there is little to suggest that contaminated soils or groundwater exist in the areas proposed for construction. However, there is the remote possibility that such materials could reach surface waters if they are encountered during construction.

Leaks or spills of fuels, hydraulic fluids, and other substances used in construction equipment or vehicles could occur during construction. The potential for these types of spills is typical of any construction site and could result in contamination of surface and groundwater. However, the impacts would be limited to the volume of the device or piece of equipment containing the fluids.

Reclamation Facility. Dewatering is anticipated to be minor at the reclamation facility because excavations are anticipated to be shallow. Construction of the reclamation facility and the raw sewage holding pond will result in up to 2 acres and 3 acres of impervious surface area, respectively. This would slightly reduce the amount of groundwater recharge in the area of the facility, but is not anticipated to represent a significant impact to regional groundwater resources. This minor reduction of infiltration area as a result of the facility would be offset by the infiltration from the land application practices.

Pump Station and Conveyance Force Main. Dewatering is anticipated to be likely for the pump station and some sections of force main, particularly along SR 3. As mentioned above, the amount, duration, and disposal methodology for dewatering are not known at this time, but would be determined during final design.

Land Application. Construction activities at the land application site are anticipated to be minimal. Pipelines on the site to convey the reclaimed water to the entire application area will be placed above-ground.

Service Areas. Impacts to groundwater resulting from local conveyance pipelines in both the Belfair UGA and the LAMIRD are not anticipated because such pipelines are typically constructed at shallow depths. However, some dewatering may be necessary associated with the local collection lines along SR 3 and the pump station. As mentioned above, the amount, duration, and disposal methodology for dewatering are not known at this time, but would be determined during final design.

Operational Impacts

Discharges of Class A reclaimed water to groundwater would be required to meet the groundwater standards (WAC 173-200). Groundwater standards have been developed to protect groundwater resources that are used as drinking water supplies. Prior to discharge at the land application site, wastewater will be treated to Class A reclaimed water standards. Further polishing of the effluent will occur as the water passes through the unsaturated zone prior to

reaching the underlying aquifer. Significant adverse impacts to groundwater quality are not anticipated.

Increased groundwater recharge may raise the groundwater table in the near the land application area. Depending on the amount and location, this could have either a positive or a negative effect. Higher groundwater tables may result in increased baseflows in nearby fish-bearing streams. In other areas, higher groundwater tables may result in more frequent flooding of low-lying areas and/or increased land slumping.

Additional, site-specific hydrogeologic studies and computer modeling would be necessary to determine the long-term suitability of the potential land application area. Such studies and modeling would help determine the potential impacts of groundwater recharge facilities on groundwater discharge areas, and on aquifers tapped by public water system and individual drinking water wells. Because of the undeveloped, forested nature of the proposed land application area, impacts to private wells are not anticipated.

The reclaimed water would be applied in amounts designed to coincide with the moisture and nutrient uptake rate of the trees being irrigated. At this application rate, nutrients would not penetrate below the plants' root zone; therefore, impacts to groundwater quality associated with land application would not be anticipated.

The potential impacts to groundwater quality associated with wastewater discharge are generally related to bacteria and viruses, nutrients, and chemical contamination. Surface infiltration of reclaimed water provides additional treatment beyond that achieved in the reclamation facility. Improvements in removal of suspended solids, bacteria and viruses, nitrogen/nitrate, phosphorus, some chemicals (including metals), and other constituents have been documented at sites utilizing surface infiltration as a disposal method.

Service Area. Groundwater quality would likely improve in the service areas when these areas are connected to the local sewer system and the number of on-site septic systems in these areas decreases. Failing or improperly functioning on-site septic systems can be a source of nutrients and bacteria to the local groundwater system. These sources would be eliminated as residences decommissioned their on-site systems and connected to the local sewer system.

As development occurs in the Belfair UGA, more groundwater will be withdrawn to serve the increased development. Additional impervious surface area will be created which will result in increase surface water generation. Stormwater service in the service area will not change, and stormwater will continue to flow into roadside ditches and either infiltrate into the ground surface, or flow into nearby surface water bodies.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction impacts to groundwater largely relate to the need for dewatering as described above for Alternative 1. Construction dewatering may be necessary at the reclamation facility, pump stations, and some sections of force main. The amount of necessary groundwater withdrawals and the disposal method would be determined on a site-specific basis during final design.

Operational Impacts

Operational impacts are similar to those described above for Alternative 1. However, water generated in the Belfair UGA and the LAMIRD would be transferred out of basin to the North Bay/Case Inlet area for infiltration. This may result in a slight decrease in available groundwater in the Belfair area and a slight reduction in area streamflows. Because the volume of water is relatively small (0.4 MGD), this is not anticipated to be a significant impact.

Service Area. Impacts to groundwater in the service area would be the same as described above for Alternative 1.

Alternative 3 – No Action

Construction Impacts

Construction is not proposed as part of this alternative, so there will be no construction-related impacts or dewatering.

Operational Impacts

Operational impacts to groundwater associated with the No Action Alternative include the potential for continued degradation related to failing or poorly operating on-site septic systems. Failing or improperly functioning on-site septic systems can be a source of nutrients and bacteria to the local groundwater system. Groundwater near the LAMIRD discharges to Lynch Cove, and may be a contributing source of contaminants to Lynch Cove.

Cumulative Impacts

This project is one of numerous methods designed to improve water quality in Lynch Cove and Hood Canal. Elevated groundwater tables may increase base flows in area streams near the land application site.

Increased use of on-site sewage systems associated with the No Action Alternative would cumulatively contribute to pollutant loading, particularly nutrients and bacteria, to the groundwater system throughout the service area.

Mitigation Measures

Measures designed to reduce construction-related impacts include the following:

- Conduct site-specific review to determine the presence and/or extent of contaminated soil and/or groundwater.
- Schedule construction during the dry summer months, when possible, to reduce the amount of construction dewatering necessary.
- Provide treatment, as necessary, to any withdrawn groundwater prior to release to a surface water body or storm drainage system.

Measures designed to reduce the potential for groundwater quality degradation associated with the reclamation facility and land application include the following:

- Treat wastewater to Class A reclaimed water standards prior to application.
- Maintain application rates that are equal to vegetation nutrient and moisture requirements.
- Conduct extensive geotechnical and hydrogeologic studies prior to development of recharge facilities.
- Establish a groundwater monitoring network to detect any changes in groundwater quality resulting from operation of the recharge facility.

Measures designed to reduce the potential for groundwater quality degradation associated with additional growth and increased impervious surface area in the service area include compliance with stormwater requirements. Refer to Section 4.3 for further discussion.

Alternative 3 – No Action

Measures designed to reduce the potential for groundwater quality degradation associated with increased use of on-site sewage systems include the following:

- Design, construct, and maintain on-site sewage systems in a manner that will minimize the potential for groundwater quality impacts.
- Limit on-site sewage system to densities no greater than soil/groundwater conditions can support.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to groundwater associated with Alternatives 1 and 2 have been identified.

Increases in fecal coliform and nitrate levels in groundwater are likely to occur as a result of increased use of on-site sewage systems within the Belfair UGA and LAMIRD associated with the No Action Alternative.

4.5 Biological Resources - Vegetation and Wildlife

Affected Environment

Existing Regulatory Requirements

A range of federal, state, and local regulations govern vegetation, wildlife, and wetlands in the project area. Table 4.5-1 provides a summary of these regulations.

Table 4.5-1. Summary of Regulations Governing Potential Impacts to Plants, Animals, and Wetlands

Statute	Lead Agency	Regulated Activities
Federal – U.S. Army Corps of Engineers (COE)		
Section 10 of the Rivers & Harbors Act (33 USC 403)	Corps of Engineers – local district	Any work in or affecting navigable waters of the U.S. (such as piers, floats, outfalls, dredging). Navigable waters are those subject to the ebb and flow of the tide and/or are currently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Clean Water Act (CWA) Section 404 (33 USC 1344)	Corps of Engineers – local district	Discharge of dredged or fill material into waters of the U.S., including navigable waters and wetlands within Corps jurisdiction. Individual or nationwide permits are required, depending on project impacts.
Federal – U.S. Fish & Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries		
Endangered Species Act (ESA) (16 USC 1531)	USFWS & NOAA Fisheries	The ESA prohibits the "take" of listed species without a special permit. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any of these actions. ESA review is required.
Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1801)	NOAA Fisheries	Purpose is to promote protection, conservation, and enhancement of Essential Fish Habitat (EFH). EFH includes those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The MSA requires all federal agencies to consult with NOAA Fisheries on all actions or proposed actions that are permitted, funded, or undertaken by the federal agency that may adversely affect designated EFH.
Migratory Bird Treaty Act (16 USC 703)	USFWS	Prohibits the "take" of all birds, including their nests, eggs, and young, with the exception of the European starling, English sparrow, and domestic pigeon (non-native species).
State – Washington State Department of Fish & Wildlife (WDFW)		
State Hydraulic Code/Hydraulic Project Approval (HPA) (RCW 75.20.100-160)	WDFW	HPA required for work that uses, diverts, obstructs, or changes the natural flow or bed of state waters. Activities include: bridges, piers, & docks; pile driving; channel change/realignment; pipeline crossing; culvert installation; dredging; gravel removal; pond construction; placement of outfall structures; log, log jam, or debris removal; installation/maintenance of water diversions.
State – Washington Department of Community, Trade and Economic Development (CTED)		
Growth Management Act (GMA) (RCW 36.70A)	CTED	The GMA stipulates that local agencies adopt regulations based on best available science that protect critical areas, including but not limited to, wetlands, streams, and fish and wildlife habitat areas.

Statute	Lead Agency	Regulated Activities
State – Washington State Department of Natural Resources (WA DNR)		
Aquatic Lands Lease (RCW 79.90)	WA DNR	Temporary, long-term, or permanent use or encumbrance of state-owned aquatic land.
Forest Practices Act (RCW 76.09)	WA DNR	Forest practices including tree harvesting, salvaging trees, controlling brush, applying chemicals, and conversion of forest to non-forest use.
State – Washington State Department of Ecology (Ecology)		
Water Quality Certification Section 401 of the Clean Water Act (33 USC 1344)	Ecology	Required when applying for a federal license or permit to conduct any activity that may result in any discharge into Waters of the United States or of the State of Washington, including regulated wetlands.
Coastal Zone Management Act Consistency Determination (CZMA) (16 USC 1451)	Ecology	A CZMA is triggered by activities undertaken by a federal agency, activities requiring federal approval, or activities that use federal funding, AND those activities that are either in the coastal zone or that would impact coastal resources.
National Pollutant Discharge Elimination System (NPDES) Permit (RCW 90.48, 90.54)	Ecology	Triggered by point source wastewater discharges to surface water from industrial facilities or municipal wastewater treatment plants, point source stormwater discharges to surface waters from industrial facilities and from construction sites of 1 or more acre, and stormwater discharges from municipal separate storm sewer systems that serve populations of 100,000 or more.
Floodplain Management Program	Ecology	Applies to activities within the 100-year base floodplain as designated on Federal Emergency Management Agency (FEMA) maps.
Local – Various Agencies		
Shoreline Masters Program (MCC,Title 7)	Mason County	Provides for the management of the shorelines by fostering all reasonable and appropriate uses. Its regulations implement the policies intended to protect against adverse effects to public health, land, vegetation, and fish and wildlife.
Critical Resource Ordinance	Mason County	Applicable to projects proposed near or within critical areas (wetlands, streams, steep slopes, and others) or their buffers.

Existing Habitat Types

The project vicinity encompasses a series of habitat types, ranging from developed areas, to vegetated terrestrial habitats, to wetlands and estuaries (Table 4.5-2). Each of these habitat types can support numerous species of mammals, birds, reptiles, and amphibians. Some of these species are listed as special-status species by the state and/or federal governments and are discussed as such under specific headings in this section.

Table 4.5-2. Habitat Types Identified in the Project Vicinity

Habitat Type	Description
Developed areas	Industrial and commercial buildings, residential areas, and associated infrastructure for transportation, utilities, and drainage.
Salt Marsh/ Estuary	Dominant species vary by marsh and estuary location, but include sedge meadows, salt grasses, pickleweed, sea arrow grass, and cordgrass species
Upland forest	Dominant trees include Douglas fir, western hemlock, western red cedar, red alder, big leaf maple, and black cottonwood; the age of forest patches varies throughout the project vicinity, from saplings to mature stands.
Upland grassland	On disturbed soils, typically dominated by bentgrass, velvetgrass, and a mix of weedy herbs.
Forested wetland	Dominant species vary by wetland area and include red alder, western red cedar, black cottonwood, species of willows, salmonberry.
Scrub-shrub wetland	Dominant species vary by wetland area and include red alder, red-osier dogwood, willow species, and spiraea.
Emergent wetland	Dominant species include reed canarygrass, bentgrass, soft rush, and creeping buttercup.
Open water	Includes both fresh and saltwater areas; Hood Canal, ponds, oxbows, rivers, streams.

Priority Habitats

The State of Washington has designated several types of priority wildlife habitats, which are "those habitat types or elements with unique or significant value to a diverse assemblage of species" (WDFW, 1999). Priority habitats that have been either mapped in the project area or are likely to occur are summarized in Table 4.5-3.

Table 4.5-3. Washington State Priority Habitats in Project Vicinity

Habitat Type	General Description	Occurrence in Project Vicinity
Habitat for cavity-nesting ducks	Breeding areas and regular large concentration areas for ducks that nest in tree cavities, such as wood duck, Barrow's goldeneye, common goldeneye, bufflehead, hooded merganser.	Breeding areas have been mapped by WDFW in several wetlands associated with rivers and creeks in the project vicinity. Suitable habitat is likely present in other, unmapped areas as well.
Riparian zones	A riparian zone is the area adjacent to a body of water, such as a stream, lake or wetland, which contains elements of both terrestrial and aquatic ecosystems that mutually influence each other. Riparian areas can have high diversity and density of fish and wildlife.	Located along water bodies throughout project vicinity, such as the Union River, Coulter Creek, and Big and Little Mission Creeks.

Habitat Type	General Description	Occurrence in Project Vicinity
Snags and logs	Snags (decaying trees) and logs support a number of cavity-nesting species. Snags near open water, remnant snags in developed areas, and areas with a high density of snags can be particularly valuable, as are larger snags and logs.	Not mapped by WDFW but likely to be present in forested areas throughout project vicinity and potentially as remnants in more urban areas.
Waterfowl concentrations	Regular large concentration areas, breeding areas, foraging and resting areas, and migratory stopover areas for ducks, geese, and swans. Includes lowland lakes that provide vegetation, fish, and other food sources.	Concentrations of over-winter waterfowl are mapped by WDFW in Lynch Cove and the lower reaches of the Union River.
Wetlands	Described for individual alternative sites in subsequent sections.	Mainly associated with streams and rivers draining to the Upper Hood Canal and North Bay. The lower reaches of the Union River are closely associated with a large wetland complex.. Smaller wetlands also exist in areas not directly adjacent to streams.
Vegetated Marine / Estuarine	Includes saltwater marshes, eelgrass meadows, kelp beds, and turf algae in the intertidal and subtidal zone. Esturaine habitats represent the dynamic interface between riverine and marine systems, and can have a high diversity and density of wildlife and fish species	Located within Lynch Cove and along the shorelines of Hood Canal

Source: *Priority Habitats and Species List* (WDFW, 1999)

Plants

The vegetation in the project vicinity is predominantly second/third-growth coniferous forest stands dominated by Douglas fir and western hemlock. The primary land use in the area is timber harvest and scattered Christmas tree farms. Along forest edges, stream corridors, and in clearings the dominant tree species are vine maple, red alder, and black cottonwood. Within these upland forested areas the understory is composed of a variety of shrubs and groundcovers including common snowberry, black twinberry, and salal. In the extensive wetland areas along the Union River and in other depressional wetland locations, the undergrowth likely includes salmonberry, Pacific ninebark, Indian-plum, red-osier dogwood, and a variety of willows and wetland forbs.

Wetlands

The project vicinity contains a variety of wetlands, both freshwater (Riverine, Lacustrine, or Palustrine) and saltwater (Estuarine or Marine), including shallow marshes, bogs, swamps, ponds, stream corridors, estuary habitat, and shorelines. Wetlands in the project vicinity are shown in Figure 4.3-1 (Mason County, 2005). The National Wetlands Inventory (NWI) has identified these wetlands, and potential wetland sites are identified by the presence of hydric soils through the Soil Survey of Kitsap and Mason Counties.

Palustrine systems are generally shallow and include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in

tidal areas where salinity due to marine-derived salts is below 0.5 percent. Lacustrine wetlands are those primarily associated with still water lakes and ponds. Estuarine systems consist of deep-water tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open or sporadic access to the open marine water. The marine water is at least occasionally diluted by freshwater runoff from the surrounding land.

Freshwater sources such as the Union River and Coulter and Mission Creeks as well as several small upland lakes support the greatest number of wetlands in the project vicinity. Lacustrine, Palustrine emergent, forested, and scrub-shrub wetlands exist in abundance in and around these freshwater sources in upland areas of the project vicinity.

The shorelines of the Lynch Cove and North Bay/Case Inlet are almost exclusively Estuarine Intertidal wetlands with characteristics of unconsolidated shore, aquatic bed, and/or emergent wetlands that progress upland to Palustrine forested or scrub shrub wetlands. Lynch Cove and the wetlands complex associated with the confluence of the Union River and Hood Canal comprise a priority habitat identified by WDFW for high waterfowl concentrations during the winter months.

Wildlife

Wildlife known to exist in the project vicinity include mule deer, black bear, coyote, porcupine, raccoon, opossum, pine squirrel, and other rodents. Birds likely to be seen in the area include quail, osprey, great blue heron, crow, raven, peregrine falcon, kingfisher, Steller's jay, and various species of owls, woodpeckers, passerines and hawks. Mountain quail, a priority game species, has been sighted within the project vicinity over the past several years.

Harbor seals are known to utilize the upper Hood Canal, Lynch Cove area, and three pullouts on rafts and floats have been located along the southern shores of the canal. These locations are within 2 miles of the proposed service area, but are not within this distance of the treatment facilities and discharge areas.

Significant shellfish beds containing oysters and intertidal clam species are present in Hood Canal and North Bay/Case Inlet. Dungeness crabs are also present. Shellfish are discussed in more detail in Section 4.7.

Special-Status Species

Special-status species include those classified as endangered, threatened, sensitive, or candidate by the Washington Department of Fish and Wildlife (WDFW), as well as species listed as endangered, threatened, candidate, proposed, or species of concern by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service—NOAA Fisheries. A list of special-status species and their potential occurrence in the project area is presented in Table 4.5-4.

Table 4.5-4. Special-Status Species in the Project Vicinity

Species	Federal Status	State Status	Documented/Potential Occurrence in Project Vicinity
Hood Canal Summer Chum	Threatened	Candidate	Union River
Chinook Salmon Puget Sound Evolutionarily Significant Unit (ESU)	Threatened	Candidate	Hood Canal, Coulter Creek, and Union River
Coho salmon - Puget Sound/Strait of Georgia ESU	Species of Concern	None	Hood Canal, Coulter Creek, Union River, and other creeks in the project vicinity
Bull trout - Coastal/Puget Sound ESU	Threatened	Candidate	Potential Use of the Union River
Pacific lamprey	Species of Concern	None	Coulter Creek
Bald eagle	Threatened	Threatened	Nest located approximately 12 miles from the proposed Alternative 1 treatment facility
Osprey	None	Monitor	Several nests are located within the general vicinity of the project; 3 are located within 2 miles of the proposed Alternative 2 treatment facility.
Harbor Seal	None	Monitor	3 pull out areas are located within 2 miles of the project vicinity
Few-flowered sedge	None	Sensitive	Found in several areas within the Union River watershed
Adder's tongue	None	Threatened	Found in several areas within the Union River watershed

Sources: PHS map (WDFW 2006); Natural Heritage Map (WDNR 2005); Gray &Osborne, Inc 2001

The special-status terrestrial species listed by the USFWS and/or WDFW that may occur in the general vicinity of the project have not been mapped by WDFW within 2 miles of proposed reclamation facilities and associated infrastructure. Therefore, these species are not specifically addressed in this section because of the low potential for them to be affected by construction or operation of the facilities. Instead, this section addresses potential impacts to general habitat types and groups of wildlife within project construction areas, and to documented special-status species occurrences.

Special-status species present or potentially occurring on or near treatment facility sites, land application sites, or along conveyance routes are discussed in subsequent sections.

Existing Conditions on Treatment Facility Sites

Alternative 1 – Reclamation Facility near Belfair

The proposed reclamation facility site for Alternative 1 is located just outside the Belfair UGA, approximately 1.5 miles to the east of Belfair's commercial district. The roughly 48-acre site including the land application area is zoned for 5-acre rural residential plots, but is currently managed as a commercial forestry operation. A Bonneville Power Administration (BPA) easement also runs through the site. The facility site and surrounding areas contain second/third-growth upland forest habitat (Figure 3-1).

No federally or state-listed special-status species or priority habitats have been mapped by the federal government or WDFW within the boundaries of reclamation facility. The site is more than 1 mile from the documented occurrences of special-status bird species listed in Table 4.5-4. However, there were several sightings of the priority game species, mountain quail, in 1993 (WDFW, 2006). The site is within a larger general area where few-flowered sedge, a state sensitive species, and Adder's tongue, a state listed threatened species, have previously been documented. Mapped priority habitats (riparian areas and wetlands associated with the Union River and Lynch Cove) are located off-site to the west.

No wetlands or hydric soils have been identified on the reclamation facility site (Gray & Osborne, 2001).

Pump Stations. The proposed pump station associated with Alternative 1 is located in an already semi-developed area with relatively low habitat quality. There are no special-status species or priority habitat within the proposed boundaries for the expanded land application area (WDFW, 2006; WDNR, 2005)

Conveyance Force Main. The conveyance force main from the Belfair UGA to the reclamation facility is approximately 7,000 feet in length. The conveyance line does not pass through any priority habitat areas, and a review of the existing documentation for the project has not revealed any wetlands or hydric soils located along the conveyance line corridor. However, the current description of the pipeline shows the force main constructed adjacent to the unnamed stream 15-0503A (Gray & Osborne, 2003). The stream does not support a viable population of returning salmonids (WDFW, 2006). Additional site-specific studies will be conducted during facility design to more accurately characterize this stream.

The pipeline will also pass through upland forest habitat. There are no special-status species located within a mile of this conveyance force main. However, mountain quail, a priority game species, was identified in the early 1990s in the area.

Land Application Site. The proposed land application site for Alternative 1 would be approximately 33 acres in area. The dominant land cover in the application area is upland coniferous forest, managed as commercial timberlands. There are no special-status species or

priority habitat within the proposed boundaries for the application area (WDFW, 2006; WDNR, 2005).

Service Areas. The service area will include both the Belfair UGA and the LAMIRD located 2.5 miles to the west along the North Shore of Hood Canal, including Belfair State Park (Section 36, Township 23 North, Range 2 West). Based on a review of existing documentation, habitat types within the Belfair UGA include remnant forest stands, riparian areas, and unmanaged grasslands. Habitat types within LAMIRD Zone A and Zone B include developed areas, parkland, riparian areas, streams, and estuary. The conveyance line would be located along SR 300 and Mason County road rights-of-way. The conveyance line corridor would cross several streams and wetlands between the LAMIRD and the Belfair UGA.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Reclamation Facility. The NB/CI facility is approximately 5.5 miles to the southeast of the Belfair UGA. The site is bounded by lands zoned for 5-acre parcels of rural residential development, but predominantly used for commercial forestry practices. The NB/CI facility is currently operating with existing treatment, storage, and land application facilities in place. The site facilities are to be expanded within the parcel boundaries, and the land application area is to be increased from 20 to 51 acres. The dominant habitat associated with this facility is upland forest (see Figure 3-3). However, an assessment of site conditions using aerial maps reveals a multi-aged forest community influenced by commercial forestry practices. The BPA easement mentioned in the site description for Alternative 1 is approximately 1,250 feet to the north of the NB/CI facility.

No federally or state-listed special-status species or priority habitats have been mapped by the federal government or WDFW within the boundaries of the NB/CI site. However there are three osprey nests within 1 mile of the facility. The osprey is a state listed species recommended for monitoring. Mapped priority habitats (estuarine areas associated with the Sherwood Creek and North Bay/Case Inlet) are located off-site to the southeast.

Pump Stations. Alternative 2 includes two pump stations associated with the force main. In addition to the one described for Alternative 1, a second pump station is located further south near the railroad (see Figure 3-3).

Conveyance Force Main. The conveyance force main to transport wastewater from Belfair approximately 5.5 miles south of the Belfair UGA would require extending approximately 33,600 linear feet of pipeline along road and transmission line right-of-way. Most of the route would lie along SR 3, and Mason County rights-of-way (see Figure 3-3). A review of the existing documentation for the project has not revealed any wetlands or hydric soils within the boundaries of the existing reclamation facility or along the conveyance line corridor (Gray & Osborne, 2003). However, there is potential for scrub-shrub and emergent wetland habitat types along the conveyance line corridor. The conveyance line may also potentially affect areas of upland forest habitat. Although the route does not pass through any areas deemed priority habitat by WDFW, it does cross an unnamed stream used by fall chum salmon that drains from Devereaux Lake into Hood Canal (WDFW, 2006). The location of the conveyance lines will also pass within a mile of the priority habitat harbor seal pullouts along the south shore of Hood

Canal, a bald eagle (federally and state listed as threatened) nest just to the south of Belfair, common loon breeding habitat on Devereaux Lake (state listed as a sensitive species), and several osprey nests (state listed for monitoring) (WDFW, 2006).

Land Application Site. The land application site for the NB/CI reclamation facility would be expanded from 20 to 51 acres. The dominant land cover in the application area is upland coniferous forest, managed as commercial timberlands. There are no special-status species or priority habitat within the proposed boundaries for the expanded application area (WDFW, 2006; WDNR, 2005)

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Construction of the reclamation facility, pump station, and associated infrastructure could result in loss of habitat, temporary habitat alteration or disruption resulting from noise, construction crews, increased vehicle traffic, and machinery. Construction may also create reduced water quality conditions by generating erosion (see Section 4.1, Earth) and sedimentation (see Section 4.3, Surface Water) that could have adverse impacts on aquatic habitats. The accidental introduction of pollutants into the Union River, Hood Canal, and the unnamed tributary (15-0007) to Coulter Creek could also adversely impact fish and other organisms that utilize aquatic habitats (see Section 4.6, Fish Resources for more detail). With the measures that would be required as part of the construction permitting for the project, these impacts are expected to be minor.

Reclamation Facility. Construction of the reclamation facility and pump station would require clearing of vegetation. For the reclamation facility, approximately 15 acres of coniferous forest habitat would be cleared to facilitate development of the buildings and holding ponds. Based on existing documentation, there are no sensitive wildlife species or plant communities known to be present within the reclamation facility or pump station boundaries for Alternative 1 (WDFW, 2006). Additional site-specific evaluations would be conducted during facility design, to identify potential sensitive species and develop appropriate mitigation, if needed.

Construction activities could result in potential contamination of ground and surface waters if chemicals such as fuels or lubricants were to spill or leak from construction vehicles or equipment. The potential for the contaminants to impact the soil would depend on the nature and quantity of the spill, time between the spill and the cleanup, depth to groundwater, and geology of the area. Shallow groundwater in the Belfair area where the pump stations are located is susceptible to contamination due to the relatively high permeability of the valley alluvium and the potentially shallow depth of groundwater. Polluted waters could have adverse impacts to both flora and fauna. Mitigation measures such as preparation of a spill prevention, containment, and response plan would reduce the potential for spills and provide for quick recovery in the event of

accidental spills. See the mitigation measures below for Alternative 1, and Section 4.3, Surface Water.

Noise levels associated with construction could affect wildlife using habitats in the vicinity of the construction areas (EPA, 1972). Wildlife may be displaced and relocate, or acclimate to disturbance. Wildlife species differ in their ability to tolerate disturbance; tolerance depends upon a variety of factors, including: season, type of noise (sporadic or continuous), distance from the source of noise, and frequency of occurrence (Adolfson Associates Inc., 1993).

Pump Stations. Approximately 0.10 acre is required for the pump station, and the impacts of construction are same as those described for the reclamation facility, only at a smaller scale because of the smaller construction footprint. Because the pump station location is located in an area with minimal habitat value, impacts are expected to be minimal.

Conveyance Force Main. Construction of conveyance pipelines, although predominantly located in road rights-of-way, would remove weedy roadside vegetation. Areas disturbed by construction are often revegetated with non-native, invasive species, and these undesirable species may increase along the conveyance lines as a result of construction unless preventative steps are taken.

The conveyance system along the north shore of Hood Canal between the LAMIRD and the Belfair UGA has the greatest likelihood of impacting sensitive species or habitat, specifically wetlands. Site-specific surveys would be conducted during facility design to identify and characterize existing resources, and to develop designs and/or construction techniques that avoid these resources as much as possible.

If wetlands are identified in the vicinity of proposed construction areas, wetland delineations will be necessary prior to permitting. Mitigation plans for wetland and/or wetland buffer impacts may be required by local, state, and federal jurisdictions. Wetland losses could potentially be highest along the North Shore of Hood Canal and across the Union River due to the large number of wetlands located there. Impacts to any high-quality wetland area in the Union River Basin would require extensive coordination with local, state, and possibly federal permitting agencies. If impacts are unavoidable, mitigation will be required. Additional site-specific investigation would be done during facility design to avoid impacts to wetlands to the greatest extent possible, and if impacts are unavoidable, to develop appropriate mitigation.

Where appropriate, open trenching construction techniques will be utilized. However, stream and wetland crossings will be accomplished using technologies that avoid open trenching construction where possible, thus reducing the potential for direct impacts to habitat. Trenchless construction techniques such as horizontal directional drilling and microtunneling coupled with the implementation of construction best management practices would substantially reduce potential impacts to habitat.

Land Application. Construction activities in the land application area will be minimal. The irrigation system would include a valve vault, force main, pumps, and header system as well as overland high-density polyethylene (HDPE) laterals, and cause only short-term disruption to flora and fauna.

A gravel road will be built to provide access to the reclamation facility and land application area. The construction impacts of this access are similar to those described above for the reclamation facility.

Service Areas. Although disruptive, construction activities in the service areas would not have a substantial impact to existing habitat due to the relatively low quality of habitat in these developed locations. To the greatest extent possible, collection lines will be constructed within existing roadway rights-of-way. Approximately five stream crossings may be required in the UGA collection area depending upon design of the system, and two crossings within the LAMIRD. For stream crossings, pipelines will be constructed using horizontal directional drilling, microtunneling, or other construction methods that would cross below the resource and reduce impacts to habitat. All stream crossings would be conducted in accordance with permit requirements from Washington Department of Fish and Wildlife, Mason County, and applicable federal permit agencies.

Operational Impacts

Reclamation Facility. Approximately 15 acres of mixed-age coniferous forest would be lost to the construction and operation of the reclamation facility. This area currently provides habitat for some wildlife species, including deer, elk, coyote, and black bear that utilize upland forest habitat. These animals would likely leave the area during construction, but would likely return following construction. Some songbird and woodpecker species may be permanently displaced. Due to the lack of listed species and priority habitat within and immediately adjacent to the reclamation facility and pump station sites, the impact on local wildlife populations would not be significant.

Provision of a centralized wastewater treatment system will also indirectly impact available habitat by facilitating development of currently undeveloped areas within the Belfair UGA, resulting in a net loss of habitat. This area has been designated by Mason County as a Rural Activity Center, and environmental impacts associated with this development have been evaluated as part of the County's comprehensive land use planning process. Individual proposed development would be required to comply with all applicable federal, state and local requirements, which should ensure that sensitive habitats will not be affected, but there would be a net loss of habitat within the Belfair UGA.

Emergency Overflows. In the very unlikely event of severe system failures during power outages, mechanical failures, or other emergencies, there is a potential for emergency overflow of partially treated wastewater to occur, which could result in impacts to biological resources. All state and federal guidelines for system reliability and emergency systems would be complied with. These measures would greatly minimize the potential for release of partially treated wastewater from the reclamation facility and pump stations. Should a system failure occur, flows would likely back up in the collection system upstream of the pump stations, and discharge at the lowest point within the collection system. This would likely be a manhole located near the pump station. Impacts would depend upon the location of the manhole and the volume of the overflow, but could include temporary but significant increases in bacteria, nutrients and other constituents in wastewater that could affect fish or biota in adjacent water bodies. At the reclamation facility,

system failures would result in wastewater being diverted by gravity to the by-pass storage pond that has a 5-day storage capacity.

With the measures that would be required as part of permitting for the project, the risks associated with an emergency overflow would be minimized. The mitigation measures discussed below would further reduce these potential impacts.

Increased Noise, Lighting, and Human Activity. Noise during operation of the reclamation facility may have a slight impact on noise-sensitive species that currently use habitats near the site, but would not likely impact any special-status species. Nighttime noise levels would increase because the reclamation facility would operate 24 hours per day; however, no significant noise impacts are anticipated because the noise levels would be relatively low. Lighting will be required at the site, but the increased lighting would largely be contained within the site and would not significantly illuminate the surrounding area. Because of the relative lack of wildlife habitat on the site and low levels of increase in noise and lighting, adverse effects on wildlife due to increased noise and light levels would be negligible.

Conveyance Force Main. Following construction, operational impacts associated with the conveyance lines would not be expected to occur.

Pump Station. The operational impacts of the pump station are the same as those described for the reclamation facility, but at a smaller scale. The total area disturbed for construction of the pump station would not exceed 0.1 acre.

Land Application. In the land application area, the reuse of reclaimed wastewater is likely to have a localized beneficial effect upon vegetation. The reclaimed water will be spray irrigated on the upland forest habitat within the boundaries of the managed commercial forestry operation, dominated by coniferous tree species, at agronomic rates (1.83 inches per day applied to one-third of the area). This will allow uptake of the nitrogen within the reclaimed water by the trees. A forestry management advisor will be consulted to develop the proposed forestry management plan to determine how to best utilize the reclaimed water on site.

Increased nutrients and moisture are anticipated to enhance vegetative productivity at the site; however, over-application could have adverse impacts to the vegetation at the site. Over-saturation may lead to anaerobic conditions that could cause trees to weaken and/or die within the application area. Further, over-application may result in runoff from the site that could cause erosion that in turn could possibly impact the unnamed tributary to Coulter Creek.

To ensure that the site will not become over-saturated during rainy periods of the year, the reclaimed water would be stored on-site until continued irrigation would be acceptable. The facility design will include a Class A storage pond to retain up to 46 days in the event that conditions do not permit irrigation.

Extensive site-specific studies will be conducted to confirm preliminary soils and vegetation conditions at the site, and the proposed mix of vegetation at the site will be carefully designed to ensure that the trees planted will have the greatest potential for survival under the proposed application rates. Following project implementation, the vegetation will be monitored for survivability.

Service Areas. As discussed above, providing a centralized wastewater treatment system within the Belfair UGA will allow planned development to occur in accordance with the Mason County Comprehensive Plan. This will ultimately result in a net reduction in habitat within the Belfair UGA, and may create pressure to extend the UGA or to allow additional development that is not consistent with the existing Comprehensive Plan. Refer to Section 4.10, Land and Shoreline Use, for additional discussion of this potential impact. Within the Belfair UGA, the types of habitat that will likely be affected by increased development include remnant forest stands, riparian areas, and unmanaged grasslands.

As described in Section 4.10, Land and Shoreline Use, the area within the LAMIRD is largely developed. Additional development potential is limited to approximately 25 additional parcels within LAMIRD Zone A, and approximately 215 parcels within LAMIRD Zone B (Mason County, 2006). However, provision of a wastewater treatment system may result in a trend for replacement or substantial remodel of existing residences, as limitations associated with septic systems are removed. This trend could result in increased impervious surfaces at individual home sites, accompanying expansions and remodels of existing facilities. And new development or redevelopment would occur in accordance with Mason County Code requirements, which includes shoreline, wetland, and habitat protections. Direct impacts to habitat are not expected to be significant, because many of these areas are currently lawns or other maintained vegetation, but indirect impacts to adjacent wetland and riparian areas could occur from increased runoff. Mason County is currently in the process of reviewing and revising stormwater requirements to address this issue and other issues associated with stormwater management (Steve Goins, personal communication, 2006).

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

The construction impacts for Alternative 2 do not vary greatly from those described for Alternative 1 with the exception of one additional pump station associated with Alternative 2. Since the site is already developed as a wastewater reclamation facility, the construction impacts on habitat and sensitive species for expanding the facility within its parcel boundaries will be minimal.

Operational Impacts

The operational impacts for Alternative 2 are similar to those described for Alternative 1.

Service Area. Impacts to the service area are the same as those described for Alternative 1.

Alternative 3 – No Action

Construction Impacts

Since there are no construction activities proposed for Alternative 3, there will be no impacts. However, vegetation will be cleared on a site-by-site basis associated with housing development and drainfield installation for on-site sewage systems.

Operational Impacts

If no action is taken, it is likely that water quality conditions in Lynch Cove and other areas of Hood Canal will continue to receive bacterial and nutrient inputs from failing on-site septic systems, impacting fish and wildlife that utilize both marine and freshwater aquatic habitat.

Cumulative Impacts

Long-term operational impacts from Alternatives 1 and 2 would include reduced nutrient and bacterial inputs to Lynch Cove and tributary fresh waters, which would be expected to improve water quality conditions for the lower Hood Canal and Belfair area. This is expected to ultimately improve the conditions for fish and other aquatic organisms that utilize freshwater and marine habitats (refer to Section 4.6, Fish Resources).

The development that would occur following provision of wastewater service will contribute to a trend for reducing the quantity and quality of wildlife habitat in the Belfair UGA. Mitigation measures will help to reduce the impact of lost habitat, but as with all developing communities, there will be some net loss of habitat.

Mitigation Measures

Construction

Mitigation techniques for the construction impacts of the reclamation facility, pump stations, and associated infrastructure for erosion, contaminant spills, and noise are similar to those described in Section 4.1, Earth Resources. Details for mitigating sedimentation impacts for surface waters are found in detail in Section 4.3, Surface Water Resources.

The following measures would be implemented to minimize construction impacts for the facilities and infrastructure associated with Alternative 1 or 2:

- Perform site-specific investigations to identify biological resources on or near facilities. Design facilities to minimize habitat disruption.
- Restore disturbed areas to the maximum extent practicable.
- Follow all regulatory requirements.
- Use construction BMPs to minimize sedimentation impacts.
- Use spill prevention measures.
- New development or redevelopment (including within the LAMIRD), will comply with Mason County Resource Ordinances that contain substantial wetland and habitat protection measures.
- Schedule construction within work windows specified by WDFW, Corps, NOAA Fisheries, and/or USFWS to avoid critical periods (i.e., nesting and breeding/spawning, migration, overwintering) for wildlife and fish. Confine in-stream work, where unavoidable, to the period designated by WDFW when salmonids are least likely to be present.

- Examine the necessity for a bald eagle management plan as required by the Bald Eagle Protection Rule (WAC 232-12-292) for proposed land use activities involving property containing or adjacent to an eagle nest.
- If required for federal permitting or funding, perform consultation as required by Section 7 of the Endangered Species Act (ESA). Mason County will comply with any requirements imposed by the federal regulatory process regarding federal special-status species.
- Search for Adder's tongue and few-flowered sedge when conducting site and conveyance line reconnaissance as well as when delineating wetlands. If either of these species is found, mark the populations and avoid them during construction.

Operation

The following measures could be implemented to minimize operation impacts of the facilities and infrastructure associated with Alternative 1 or 2.

- Implement spill containment measures (Section 4.1, Earth).
- Utilize a stormwater management system per regulatory requirements (Section 4.3, Surface Water).
- Use treatment methods that minimize substances that could adversely impact biological resources.
- For the spray irrigation area, conduct water quality monitoring and reporting to ensure that the discharged highly treated water meets or exceeds all water quality standards. This monitoring would occur prior to discharge and in the environment receiving the discharge. Regularly monitor application rates to ensure that the rate of irrigation is appropriately balanced to meet moisture and nutrient requirements of the trees.
- Conduct biological and water quality monitoring in the unnamed tributary of Coulter Creek to determine and assess any alterations, and adaptively manage system to enhance conditions.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to biological resources are expected to result from construction or operation of the system.

4.6 Fish Resources

Affected Environment

Hood Canal, including the Belfair, Case Inlet, and Lynch Cove areas, provide a rich diversity of habitat for fish resources. Table 4.5-4 presented salmonid species that have been documented in streams and other water bodies in the project vicinity, including Hood Canal (Lynch Bay), Case Inlet (North Bay), Mission Creek, Little Mission Creek, Union River, and an unnamed stream (14.0127) along the south shore of Hood Canal, which flow to Lynch Cove, as well as Coulter Creek and West Fork Coulter Creek (unnamed stream), which flow to North Bay/Case Inlet. These water bodies are discussed in further detail in Section 4.3, Surface Water; see Figure 4.3-1 for a map of major streams and rivers in the project area.

Chinook salmon, summer chum salmon, and steelhead are designated as special-status species under the federal Endangered Species Act. The presence of special-status fish species is discussed in detail for each alternative later in this chapter. Other fish species found in streams within the project area include fall chum salmon, cutthroat and rainbow trout, lamprey, and sculpins. The Washington Department of Fish and Wildlife (WDFW) stocks 14 lakes on the Tahuya Peninsula with rainbow trout.

Fish resources within the fresh waters of the project vicinity are briefly described below. All information is taken from the Priority Habitats and Species database (WDFW, 2006).

- Union River supports fall Chinook, winter steelhead, fall and summer chum salmon, coho salmon, pink salmon, and cutthroat and rainbow trout. The Union River provides spawning and rearing habitat for fall Chinook and spawning habitat for chum salmon.
- Coulter Creek supports runs of fall Chinook, fall and summer chum, winter steelhead, coho salmon and cutthroat trout. The West Fork supports fall Chinook, fall chum, coho, and cutthroat. Spawning habitat for coho and chum was observed in the mainstem. Other freshwater fish species identified in Coulter Creek include Pacific lamprey, western brook lamprey, coast range sculpin, and reticulate sculpins.
- Mission Creek supports fall Chinook salmon, winter steelhead, fall chum salmon, coho salmon, and cutthroat trout. Spawning and rearing habitat for chum, fall Chinook, and coho, and spawning habitat for steelhead, are present.
- Unnamed stream 14.0127 supports winter steelhead, cutthroat trout, and coho. Spawning and rearing habitat for coho is provided in the lower 2,500 feet.

WDFW has operated a salmon hatchery at the mouth of Coulter Creek since 1979; operation of the weir for broodstock collection poses a migrational barrier at certain times of the year. No other passage barriers have been identified on the mainstem, although there is a partial barrier due to a culvert on Tributary 15.0002 at Coulter Creek Road, and several potential barriers due to gradient on the tributaries (SalmonScape, 2006). The hatchery raises approximately 3 million fall Chinook fry annually and releases them in Capital Lake in Olympia from January through May. No hatchery fish are released to the Coulter Creek system. Natural spawning (in a good year)

within Coulter Creek includes 2,000 to 5,000 chum salmon, 2,000 to 5,000 coho salmon, 500 to 1,000 Chinook salmon, and coastal cutthroat trout (Lovrek, personal communication, 2006).

Marine fish species found in Lynch Cove and often caught for sport include Pacific tomcod, brown rockfish, rock sole, English sole, starry flounder, and sand sole. Forage fish are another important fish resource in Lower Hood Canal. Both Pacific herring and surf smelt spawn within Hood Canal and may be found in Lynch Cove. Herring spawn, generally on aquatic vegetation including eelgrass, in the nearshore area of the Canal east of Sisters Point. Surf smelt spawn at the upper intertidal beaches on coarse sand and fine-gravel beaches. Surf smelt spawning beaches have been documented along most of the south shoreline between Union and Belfair. On the north shore, surf smelt spawn has been observed from the mouth of Stimson Creek westward to about one mile east of Sisters Point. Spawning occurs from September to late November.

Existing Regulatory Requirements

Fishery resources in the project area are co-managed by the WDFW and the Skokomish and Squaxin Tribal Nations. By law, the tribe is entitled to 50 percent of the fish harvest. The WDFW manages the non-treaty share of the harvest for commercial and sport users. Much of the coordination and communication with WDFW is through the Northwest Indian Fisheries Commission (NWIFC), which is composed of Puget Sound and coastal tribes. The NWIFC provides a number of support programs to the member tribes to assist in their management and enhancement of fish stocks.

Tribal Fishing Jurisdiction

The Skokomish and Squaxin Tribes manage their harvest within their Usual and Accustomed Fishing Grounds, which are defined as every fishing location where members of a tribe customarily fished from time to time at and before treaty times, however distant from the then usual areas occupied by the tribes. All waters within south Puget Sound and the majority of Hood Canal are included within the tribes' Usual and Accustomed fishing areas.

Fisheries Utilization

The Skokomish Tribe traditionally harvests coho, chum and Chinook salmon along with manila, butter, and horse clams and Pacific oysters (Wolf, personal communication, 2006). The Skokomish Tribe has no directed salmon fishery in Hood Canal east of the Tahuya River mouth (Ereth, personal communication, 2006).

The Squaxin Tribe harvests Chinook salmon with drift nets between August and September within the North Bay area. The Squaxin Tribe in the North Bay area does not generally target coho and chum salmon for harvest; however, their fishery does allow fishing for these species. Coho salmon are generally targeted in mid-September through October, and chum salmon are targeted from mid-October through December.

Threatened and Endangered Species

Puget Sound Chinook

Fall runs of Puget Sound Evolutionarily Significant Unit (ESU) Chinook salmon occur in Mission Creek, Union River, and Coulter Creek (WDFW, 2006). Puget Sound Chinook were listed as threatened under the Endangered Species Act (ESA) in March 1999 (Federal Register, 2005). Hood Canal summer/fall Chinook enter fresh water from late July through early October, with peak entry in late August. The Hood Canal stock was characterized as "healthy" based on stable returns to the Skokomish River, but runs in many of the smaller streams were rated "depressed" (WDFW, 1992). The 2002 Salmon Stock Inventory did not discuss Chinook salmon status or distribution in Lower Hood Canal (WDFW, 2002). Chinook enhancement programs operated by the WDFW, U.S. Fish and Wildlife Service (USFWS), and the tribes have influenced the genetic integrity of Hood Canal Chinook populations (Kuttell, 2003). Chinook status was not rated in the tributaries to south Puget Sound, including the Case Inlet (North Bay) tributaries (WDFW, 2002).

Freshwater habitat within the West Kitsap and Kennedy Goldsborough watersheds was excluded from critical habitat status (Federal Register, 2005). However, Puget Sound Chinook critical habitat does include nearshore marine areas from extreme high water to no greater than 30 meters depth relative to mean lower low water (MLLW) (Federal Register, 2005).

Hood Canal Summer Chum

The Hood Canal summer-run chum salmon ESU occurs within the project vicinity in the Union River (WDFW, 2006). NOAA Fisheries listed Hood Canal summer chum as threatened under the ESA in March 1999. Hood Canal summer chum were divided into the Hood Canal and Union River stocks. They enter the canal from early August through late September. Union River summer chum spawn from late August to early October, one to two weeks earlier than Hood Canal stock summer chum; most spawning occurs in the lower 3 miles of stream (Kuttell, 2003). Union River summer chum are differentiated from Hood Canal summer chum based on genetics, geographic separation of spawning grounds, and earlier spawn timing. The Union River summer chum stock was rated "healthy." In 2000, a hatchery supplementation program was begun in cooperation with the Hood Canal Salmon Enhancement Group in order to increase the abundance of Union River summer chum and allow for reintroduction of summer chum to the Tahuya River (WDFW, 2002).

Critical habitat for Hood Canal summer chum includes spawning, rearing, and migration habitat in the Union River as well as nearshore marine areas from extreme high tide to a depth of 30 meters MLLW (Federal Register, 2005).

Summer chum also occur in Coulter Creek, part of the Puget Sound-Strait of Georgia ESU, which is not warranted for listing under the ESA. The South Sound – Case Inlet summer chum stock was listed as "healthy" based on strong escapements. Case Inlet summer chum typically spawn between middle and late October (WDFW, 2002).

Steelhead

The Puget Sound Distinct Population Segment (DPS) steelhead occurs within the project vicinity in Mission Creek, Union River, unnamed stream 14.0127, and Coulter Creek. NOAA Fisheries proposed the Puget Sound steelhead DPS for listing as threatened under the ESA in March 2006 (Federal Register, 2006). Adult steelhead enter fresh water from December through May and spawn from mid-February to early June (Kuttell, 2003). The stock status is unknown (WDFW, 2002). Hatchery steelhead were historically released into Hood Canal tributaries, but planting was discontinued in 1996 because of concerns about the effects of hatchery fish on wild steelhead production (Kuttell, 2003).

No Critical Habitat has been designated for the Puget Sound steelhead at this time.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Construction of the reclamation facility, pump stations, and associated infrastructure could result in temporary habitat alteration or disruption resulting from erosion and sedimentation. Grading and excavating could result in erosion from disturbed upland soils and increase the sediment load in adjacent streams. Sedimentation is a concern since it can degrade spawning habitat, increase scour potential, degrade salmonid rearing habitat, and alter riparian vegetation. Erosion of upland soils may increase turbidity and sedimentation over the short term. In the long term, disturbed areas that are not properly revegetated may be a source of chronic erosion and sedimentation, if not properly maintained following construction.

However, these impacts are anticipated to be insignificant assuming that construction best management practices (BMPs) will be utilized appropriately to minimize impacts. Site-specific erosion control measures will not be specified until final design is complete; however, construction of the proposed action will be required to meet Mason County erosion control standards. Because BMPs will be implemented and construction methods include directional drilling beneath streams, sedimentation within adjacent streams resulting from construction activities is expected to be insignificant.

Reclamation Facility. Short-term erosion is likely to occur in all areas of construction involving exposed soils. Eroded soils could enter surface waters, affecting water quality. The extent of erosion impacts would depend on the duration of construction, the extent of the area exposed, the type of soils exposed, and precipitation. Approximately 15 acres of currently vegetated area will be cleared for the construction of the reclamation facility and holding ponds. This site is relatively flat and includes soils not prone to erosion (see Section 4.1, Earth Resources). Therefore, impacts to receiving water bodies are expected to be minimal. The construction BMPs described in Section 4.1, Earth Resources, could be used to minimize erosion impacts.

Other potential impacts from Alternative 1 include exposure of contaminated soils to surface waters; spills of fuels, hydraulic fluids, and other substances from construction equipment; and sedimentation and turbidity from dewatering activities. These impacts have the potential to degrade water quality and impact fish resources. However, based on the distance of the reclamation facility to the marine nearshore or to streams leading to the nearshore, the adherence to a spill prevention and control plan, and the assumed implementation of construction BMPs, these impacts are considered insignificant to fish resources.

Conveyance Force Main. Construction-related impacts to fish resources include potential sedimentation and erosion in adjacent surface water bodies and reduced water quality in the receiving waters (refer to Table 4.5-4 and Figure 4.3-1). No construction will occur directly adjacent to Lynch Cove or North Bay; however, several streams and wetland areas will need to be crossed in order to install the force main, which increases the potential for surface water quality impacts to both the streams and their subsequent receiving waters (Lynch Cove/North Bay). Increased turbidity and reduced dissolved oxygen levels in water bodies can be detrimental to water quality and in turn, fish and aquatic habitat. Stream and wetland crossings will be accomplished using technologies that avoid open trenching, thus reducing the potential for direct impacts to water quality. Alternative 1 includes 7,000 linear feet of trench construction. Trenchless construction techniques such as directional drilling and microtunneling, coupled with the implementation of construction BMPs, should result in minimal impacts to water quality and therefore to fish resources.

Other potential impacts would be similar to those described above for the reclamation facility.

Pump Station. Construction-related impacts to fish resources associated with construction of the pump station would be similar to those described for the reclamation facility, but of a lower magnitude because the construction footprint of the site is estimated to be approximately 0.1 acre.

Land Application. Construction activities in the land application area will be minimal, involving laying small-diameter irrigation pipes on the ground surface. This would result in insignificant amounts of soil disturbance. Therefore, land application has a low potential for causing erosion and subsequent water quality problems associated with sedimentation and turbidity. Impacts to fish resources would be insignificant.

Service Areas. Described below are potential construction-related impacts to fish resources associated with the service areas.

Belfair UGA. Pipeline construction within the service area could result in impacts to adjacent surface water bodies, as described above. This could affect fish resources in both Lynch Cove and North Bay and their associated tributaries within the service area, which include the Union River and unnamed tributaries 150503A and 150504, Sweetwater Creek, Alder Creek, unnamed tributary 150522, and two other unnamed streams. Fish use in these streams is described above and listed in Table 4.5-4. The use of properly installed construction BMPs would prevent construction impacts.

LAMIRD. Pipeline construction within the service area could result in water quality impacts to adjacent surface water bodies, as described above, and could therefore impact fish resources in both Lynch Cove and its associated tributaries within the service area. These tributaries include Sundstrom Creek, Little Mission Creek, Mission Creek, and two unnamed tributaries. Fish use in these streams is described above and listed in Table 4.5-4. The use of properly installed construction BMPs would prevent construction impacts.

Operational Impacts

Water Quality Improvements. Alternative 1 would reduce the current level of bacterial and nutrient inputs to the waters of Hood Canal (Lynch Cove) by connecting residences in the service area that are currently on septic systems to the proposed sewer system. Eliminating inputs from failing or poorly functioning septic systems will reduce sources of fecal coliform bacteria and nitrogen loading to Lynch Cove, which has impaired water quality (low dissolved oxygen, fecal coliform bacteria, and pH). Discontinuing nitrogen inputs to Lynch Cove could help to reduce anoxic conditions that are contributing to fish kills in Hood Canal.

There are a number of sources of nitrogen to Lynch Cove, and failing on-site systems represent one contributor to this problem. Elimination of the nutrient loading from more than 280 existing residences within the North Shore/Lynch Cove area (those residences located within LAMIRD Zone A) would, however, remove a substantial source of loading to the nearshore area of Lynch Cove. Additional studies will be needed to determine if this nutrient loading reduction will be enough to affect the dissolved oxygen depletion problem, but it will represent substantial reduction in what has been recognized as a major contributor to low dissolved oxygen in Lynch Cove. While nitrogen inputs from shoreline septic systems may account for a relatively small percentage of the freshwater inputs of dissolved nitrogen to Hood Canal, removing these sources will contribute to a cumulative reduction in overall nitrogen inputs into Hood Canal.

As discussed in Section 4.3, low dissolved oxygen conditions within Hood Canal are currently being studied by a number of federal, state, local, and tribal entities. At this time, several sources for the low dissolved oxygen conditions have been identified including ocean water flowing into the canal which is high in nitrogen, poor circulation within the canal itself, increased water temperatures, and nitrogen inputs from streams, septic systems, stormwater runoff, and decaying salmon carcasses. Other potential sources include global warming and current timber practices. An oversupply of nutrients, especially nitrogen, causes algae to bloom. Puget Sound seawater contains 17 percent more algae feeding nitrogen than all freshwater inputs combined. When algae die, they sink to the bottom and decay, removing oxygen from the water.

The low dissolved oxygen conditions are generally highest near the bottom layer of water, and this is when bottom dwelling fish, such as rockfish and lingcod, are at a high risk. If the wind picks up, the oxygen-depleted water mixes and many fish can die (USGS, 2006).

Salmonids are present in Hood Canal (Lynch Cove) virtually year round and at differing life stages, and they are also at risk to low dissolved oxygen conditions. Two federally listed species occur within Hood Canal and its drainages including the threatened Puget Sound ESU Chinook salmon and Hood Canal summer run ESU chum salmon. The Puget Sound DPS steelhead also

occurs in Hood Canal and its associated drainages, and is currently proposed for listing as threatened.

In general, bottom-dwelling fish species would benefit most from removal of nitrogen inputs. However, if mixing of oxygen-depleted water occurs, all species would benefit. Some other factors impacting salmonids within the Hood Canal basin are related to loss of habitat, altered habitat conditions associated with development, agriculture, and forest practices, and impacts to the salmonid prey base.

Endocrine disrupting compounds (EDCs) are natural and synthetic organic compounds that can block or mimic normal receptor-activating hormones in the endocrine systems of animals. EDCs originate in many different sources and represent many classes of chemical compounds. Sources of EDCs include pharmaceuticals, manufacturing byproducts, agricultural products, and household items such as detergents, cosmetics, and personal care products. Recent studies have indicated that these compounds can have detrimental effects on fish. Elimination of septic systems from nearshore areas adjacent to Lynch Cove will reduce the input of these sources from human waste to the marine waters in Lynch Cove.

Conveyance Force Main. Operational impacts associated with the conveyance force main are not anticipated.

Land Application. Reclaimed water would be spray irrigated to a forested area, and therefore no discharge would occur to surface waters. The reclaimed water would be taken up by vegetation, evaporate, or infiltrate into subsurface soils or groundwater.

Land application may provide some benefit through augmentation of base flows in downstream wetlands and water bodies, potentially improving habitat conditions for fish. However, sewage collected in basins other than the location of land application site (interbasin transfer of flows) may reduce base flows in the areas where septic systems are currently infiltrating, thus reducing potential groundwater contributions to base flows in one area and increasing base flows in another.

Additional study will be needed to determine if any augmentation of base flows would occur, and whether any benefits to base flows during summer months would result. Increased flow during this period could help maintain stream temperatures and adequate dissolved oxygen levels. If flow augmentation were to occur, it would likely benefit the stream 150007 - West Fork Coulter Creek (tributary to North Bay/Case Inlet), which contains summer and fall run chum salmon (not federally listed), Puget Sound ESU Chinook salmon (threatened), winter steelhead (proposed threatened), coho salmon (species of concern), and coastal cutthroat trout (WDFW, 2006).

Another aspect that should be considered is the effects on navigation of salmonids to their natal streams. If land application of reclaimed water occurs in a basin other than that from which the water came (such as contributions from the LAMIRD) and this reclaimed water is contributing to base flows in streams outside the basin of origin, salmonid homing instincts could be altered as a result.

Much of the water in the service area, including both the Belfair UGA and the LAMIRD, drains to Hood Canal (Lynch Cove) through surface water connections including the Mission Creek/Tahuya River basin and the Union River drainage basin. Other sources include groundwater flow from properties along the shoreline. Much of these flows will be removed from these basins and land applied to the Coulter Creek basin, which drains to Case Inlet/North Bay, under Alternative 1. The reclamation facility will process approximately 0.4 mgd, so the vast majority of this reclaimed water will come from out of basin; however, given the size of the basins that will be losing some flow capacity and the relatively low daily volumes being processed, impacts to loss of flows within the Hood Canal basin will be insignificant.

Because of the relatively low volume of effluent that would be redirected from the LAMIRD (e.g., flow from less than 300 homes, anticipated to be less than 100,000 gallons per day), this effect is not expected to be noticeable because of dilution with groundwater prior to discharge to streams. However, this issue will be discussed with fisheries resource managers and further evaluated prior to project implementation.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Alternative 2 would require more open cut excavation for conveyance and force mains than Alternative 1, and an additional pump station. These activities would require more soil disruption and could potentially provide a greater source of erosion and sedimentation. Impacts to fisheries resources related to increased sedimentation and turbidity are considered insignificant, as discussed for Alternative 1.

The conveyance force main will cross five streams between the Belfair UGA service area and the NB/CI facility. Stream crossings should be constructed in the manner described in Alternative 1.

Operational Impacts

The operational impacts for Alternative 2 are similar to those described in Alternative 1. Inter-basin transfer of flows would still occur under this alternative; however; the receiving water body would be an unnamed tributary (Coon Creek) to Sherwood Creek, a tributary to Case Inlet (North Bay). Although no fish use is documented in the unnamed streams near the land application site, fish use of Sherwood Creek further downstream has been documented and includes summer and fall run chum salmon; Puget Sound ESU summer, fall, and spring run Chinook salmon (threatened); coho salmon (species of concern); coastal cutthroat trout; and winter steelhead (proposed threatened) (WDFW, 2006).

Alternative 3 – No Action Alternative

Under the No Action Alternative, construction impacts on fish resources would not occur. Continued reliance on on-site septic systems could lead to increased levels of nutrients, bacteria, and other chemicals reaching area surface waters as these systems age and become more susceptible to failure. Continued discharge of pollutants from on-site septic systems could adversely affect fisheries resources in the Lynch Cove/Hood Canal or North Bay/Case Inlet drainage areas. In recent years, substantial fish kills have occurred in Hood Canal due to low dissolved oxygen levels. Nitrogen inputs from leaking septic systems have been identified as a

contributor to these oxygen deficient conditions. Point sources such as septic systems contribute to the total freshwater nitrogen load to Hood Canal through direct inputs from shoreline septic systems, as well as inputs through surface and groundwater in areas where septic systems discharge to adjacent streams. The project proposes to provide sewer service to residents along the shoreline and in other areas who are currently using septic systems, which will ultimately reduce the total nitrogen load to Hood Canal. Impacts to dissolved oxygen should be beneficial to fish resources.

Cumulative Impacts

Operation of a new reclamation facility in the Belfair UGA would reduce the amount of nutrients, bacteria, and other pollutants (including EDCs) entering surface waters and marine waters by reducing the reliance on septic systems. Improvements in water quality would provide an overall benefit to fisheries resources in the Lynch Cove/Hood Canal or North Bay/Case Inlet and their associated drainage areas by reducing nitrogen inputs, and thereby contributing to addressing the dissolved oxygen and fecal coliform bacteria issues in Hood Canal and the fecal coliform bacteria issues in North Bay.

With the establishment of wastewater service, the Mason County Comprehensive Plan can be more fully implemented, which could result in an increase in new construction and ultimately an increase in pollution-generating impervious surface area within the basin. If stormwater resulting from new development is not adequately managed, water quality benefits provided by the removal of septic-related inputs could be offset by increased inputs from stormwater. Impacts to fisheries could continue to occur. Continued comprehensive watershed management will be needed to ensure that fisheries resources are protected.

Mitigation Measures

Described below are measures designed to minimize impacts to fish resources.

- Implement construction BMPs to avoid and minimize potential construction impacts, including erosion and sedimentation, accidental discharge of pollutants, and dewatering and discharge of dewatering water, especially in proximity to marine shorelines (Lynch Cove, North Bay) and salmonid-bearing streams.
- Comply with applicable federal, state, and local environmental regulations to mitigate impacts to sensitive areas including wetlands, streams, buffers, and important trees.
- Continue coordination with fisheries managers with respect to water quality monitoring efforts in Hood Canal (Lynch Cove) and Case Inlet (North Bay), and coordinate with WDFW during construction to address construction timing with respect to sensitive species
- See also mitigation measures identified in Section 4.3, Surface Water, and Section 4.1, Earth.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to fisheries resources are anticipated.

4.7 Shellfish Resources

Described below are the shellfish resources of Lower Hood Canal (Lynch Cove) and Case Inlet (North Bay). Shellfish resources are discussed and characterized by region. A summary of factors affecting shellfish resources, including regulatory requirements and commercial, recreational, and tribal harvest, is also provided in this section.

Affected Environment

Regulatory Requirements

Most shellfish resource management programs within Washington State are implemented by the Washington State Department of Health (DOH) Office of Shellfish Programs, Washington State Department of Fish and Wildlife (WDFW), and Washington State Department of Natural Resources (WDNR). The WDNR manages all state-owned aquatic lands and shellfish resources, which includes issuance of use authorizations for geoduck beds. WDFW and cooperating tribes set harvest regulations for both recreational and commercial shellfishing throughout Puget Sound.

The DOH is responsible for ensuring that all shellfish harvested for commercial use is safe for human consumption. Commercial growing areas are classified based on the risk to public heath as "Approved," "Conditionally Approved," "Restricted," or "Prohibited." Determination of growing area classification is based on a water quality standard using fecal coliform as an indicator for "probable presence of pathogenic (disease causing) microorganisms" including viruses. Coliform bacteria themselves are not pathogenic, but their presence has historically been viewed as an indicator of bacterial and viral pathogens.

Regional Characterization

The intertidal area of the Lower Hood Canal and North Bay/Case Inlet shorelines support a wide variety of shellfish resources including the Pacific oyster, Olympia oyster, mussels, clams, and geoducks. Shellfish species present in Lynch Cove include four species of clams (littleneck, native littleneck, manila, and eastern softshell) as well as oysters (Ecology, 1995). As of 1990, over 11 million oysters were counted at Belfair State Park, and nearly 1.8 million oysters were of harvestable size. Dungeness crab and shrimp are other species of shellfish that are likely to occur within Lynch Cove.

Commercial and Tribal Shellfishing

Commercial shellfishing in the project vicinity is largely based on oysters, clams, and geoducks. Crabs, sea urchins, sea cucumbers, squid, and mussels are also harvested commercially, but represent a smaller and more variable portion of the commercial fishery.

The Skokomish Tribe typically harvests Pacific oysters along with manila, butter, and horse clams in Lower Hood Canal (Wolf, personal communication, 2006).

Belfair State Park installed a new large on-site sewage system and reduced the number of hookups from the adjacent RV park, resulting in improved water quality. In 2004 DOH

upgraded the classification of 138 acres of commercial shellfish growing areas there from Prohibited to Approved (DOH, 2005).

In May 1991, over 1,200 acres of commercial shellfish growing areas in North Bay/Case Inlet were downgraded from Approved to Prohibited due to contamination from failing on-site septic systems. Correction of these failures and the development of a community sewer system resulted in upgrades of 1,160 acres to Conditionally Approved by June 1992 and 1,110 acres to Approved for commercial shellfish growing in September 2002. North Bay remained on the 2006 Threatened Shellfish Growing Areas list as of April 2005 (DOH, 2005; DOH, 2006b), and an area near the mouth of Sherwood Creek remains prohibited for shellfish harvest (DOH, 2006c).

The Squaxin Tribe harvests shellfish in the North Bay area. The harvest consists primarily of manila clams, which are dug year round (Peters, personal communication, 2006). Historically the Squawksin people (one of seven groups of bands that make up the Squaxin Island Tribe with each band representing the seven inlets in deep southern Puget Sound) harvested coho salmon, chum salmon, oysters, clams, and other shellfish from the North Cove area.

Recreational Shellfishing

In 1987, part of Lynch Cove (Lower Hood Canal) was downgraded from Approved for direct harvest of shellfish to Prohibited due to unacceptable levels of fecal coliform bacteria in 630 acres of intertidal growing area. Recreational and tribal harvest was reduced at Belfair State Park, the second most productive public recreational oyster site in Puget Sound. In 1993, DOH extended the boundaries of the closure zone to include Belfair State Park. Washington State Parks and Recreation staff expressed concern about pollution presumed to be coming from the Mission/Little Mission Creek sub-basins.

As described in Section 4.3, recreational shellfishing was reopened throughout most of Lynch Cove in 2004, with the exception of a relatively small area near Belfair, which remains closed due to fecal coliform contamination. Beginning April 1, 2006, Belfair State Park was open to recreational harvesting on the western end of the park only (DOH, 2006a). In addition, recreational harvest of squid and octopus is currently closed due to low dissolved oxygen conditions (Blake, personal communication, 2006).

Threatened or Endangered Species

There are no federal or state listed or proposed threatened or endangered shellfish in the project area. The Pinto abalone is a federal species of concern and state candidate species and is known to occur in WDFW Region 6, which includes the marine waters of Hood Canal and Case Inlet.

Impacts

Impacts to shellfish resources are considered similar for both Alternative 1 and Alternative 2, since neither of these alternatives includes a direct discharge to surface waters. Construction-related impacts are considered to be negligible based on the distance of the project from the marine environment, and the construction best management practices (BMPs) used to minimize potential adverse impacts. Operational impacts will likely have an overall positive impact to

water quality and shellfish resources by reducing fecal coliform and nitrogen inputs to Lynch Cove/Hood Canal waters from individual septic systems.

Alternative 1 – Reclamation Facility near Belfair

Construction Impacts

There are no anticipated adverse construction-related impacts to shellfish resources for Alternative 1. Construction of reclamation facilities, pump stations, force mains, conveyance lines, and spray irrigation systems are a sufficient distance away from marine shoreline areas and shellfish resources to minimize potential for adverse impacts to occur. However, impacts related to soil-disturbing activities and dewatering activities, spills of fuels, oils, and lubricants from construction equipment, and mobilization of contaminated sediments/groundwater and accidental overflows could potentially reach streams or other freshwater sources and be conveyed to the marine environment where shellfish are found. Impacts, if they occur, would be temporary and short in duration.

The greatest potential for adverse impacts with respect to shellfish resources would occur during the construction of conveyance and force mains adjacent to the marine shoreline and, to a lesser degree, along major streams that discharge to both Hood Canal/Lynch Cove and North Bay/Case Inlet. All impacts to the marine nearshore environment and shellfish resources would be insignificant, assuming the appropriate construction BMPs are in place.

Reclamation Facilities. Short-term erosion is likely to occur in all areas of construction involving exposed soils. Eroded soils could enter surface waters, affecting water quality. The extent of erosion impacts would depend on the duration of construction, the extent of the area exposed, the type of soils exposed, and precipitation. Approximately 15 acres of currently vegetated area will be cleared for the construction of the reclamation facility and holding ponds. This site is relatively flat and soils are not prone to erosion (see Section 4.1, Earth). Therefore, impacts to receiving water bodies are not expected to be excessive. The construction BMPs described in Section 4.1, Earth, could be used to minimize erosion impacts.

Conveyance Force Main. Construction-related impacts to shellfish resources include potential sedimentation and erosion in adjacent surface water bodies and reduced water quality in the receiving waters (see Figure 4.3-1). No construction would occur directly adjacent to Lynch Cove or North Bay; however, several streams and wetland areas would be crossed in order to install the force main. These crossings increase the potential for surface water quality impacts to both the streams and their subsequent receiving waters (Lynch Cove/North Bay) and an overall impact on shellfish resources in the vicinity. Increased turbidity and reduced dissolved oxygen levels in water bodies can be detrimental to water quality and, in turn, to fish and aquatic habitat. Stream and wetland crossings will be accomplished using technologies that avoid open trenching construction, thus reducing the potential for direct impacts to water quality. Alternative 1 includes 7,000 linear feet of trench construction. Trenchless construction techniques such as directional drilling and microtunneling, coupled with the implementation of construction BMPs, should only have minimal impacts to water quality.

Other potential impacts would be similar to those described above for the reclamation facility.

Pump Stations. Construction-related impacts to shellfish would be similar to those described for the reclamation facility, but of a lower magnitude because the construction footprint of the pump station site is estimated to be 0.1 acre.

Land Application. Construction activities in the discharge area will be minimal, involving laying small-diameter irrigation pipes on the ground surface, which will result in insignificant amounts of soil disturbance. Therefore, land application has a low potential for causing erosion and subsequent water quality problems associated with sedimentation and turbidity. Impacts to shellfish resources will be insignificant.

Service Areas. Potential impacts within the Belfair UGA and LAMIRD Zones A and B are discussed below.

Belfair UGA. Pipeline construction within the service areas could result in impacts to adjacent marine surface water bodies, as described above, and could therefore potentially impact shellfish resources in both Lynch Cove and North Bay. The use of construction BMPs if properly implemented will prevent construction impacts.

LAMIRD. Forcemain construction within the LAMIRD areas could result in water quality impacts to adjacent marine surface water bodies, as described above, and could therefore impact shellfish resources in Lynch Cove. The higher potential for impacts exists with LAMIRD Zone A, which is closer to the marine shoreline. The use of construction BMPs if properly installed will prevent construction impacts.

Operational Impacts

Overall, Alternative 1 is expected to have a benefit to shellfish resources by improving water quality through removal of sources of fecal coliform and excess nitrogen from failing or malfunctioning septic systems. Malfunctioning septic systems have been linked to many water quality problems in Hood Canal and Case Inlet, including low dissolved oxygen and high levels of fecal coliform bacteria.

Alternative 1 would reduce the current level of bacterial and nutrient inputs to the waters of Hood Canal (Lynch Cove) by connecting residences in the service area that are currently on septic systems to the proposed sewer system. Eliminating inputs from failing or poorly functioning septic systems will reduce sources of fecal coliform bacteria and nitrogen loading to these water bodies, which have areas of impaired water quality. Anthropogenic sources of nitrogen have also been linked to low dissolved oxygen levels and algal blooms in Hood Canal, which have been linked to fish kills. As the algae dies, it settles to the bottom where it decomposes. The decomposition process uses oxygen in the water, causing an overall reduction in dissolved oxygen. In Hood Canal, the oxygen-deficient layer tends to stay close to the bottom, which puts fish in these areas at risk. During windy conditions, the oxygen-depleted water mixes and puts all species of aquatic organisms at risk throughout the water column. From May through September, the deep waters of Hood Canal may not have enough dissolved oxygen to sustain marine life—a condition known as hypoxia. When this happens, very mobile sea life, such as fish and shrimp, move up toward the surface of the water column, where dissolved oxygen levels

are higher. However, worms, snails and other less mobile marine animals often cannot escape from the low-oxygen environment (University of Washington, 2004).

Some forms of sea life show distress and die at low oxygen levels. Fast-swimming fish and invertebrates such as salmon or octopus are particularly susceptible to hypoxic conditions. As oxygen levels drop, marine animals start to show signs of distress. Fish may surface, flare their gills and gasp for breath. Shellfish might close their shells and stop feeding. Some species, such as bivalves, can persist by lowering metabolic rates. However, the rapid decline in oxygen concentration that can occur in the presence of large accumulations of macroalgae can result in extensive fish and shellfish deaths. Alternative 1 would result in lower nitrogen inputs to Hood Canal (Lynch Cove) and would therefore reduce overall nitrogen loading in the nearshore area. Additional study is needed to definitively determine the relative contributions from nitrogen sources to Lynch Cove, but reductions from all sources will be needed to correct the dissolved oxygen problem.

While a causative link has never been established between nutrient loading and the bloom of organisms causing paralytic shellfish poisoning (PSP) or other biotoxins, excessive nutrients could alter the patterns of algae growth in Hood Canal.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction impacts for Alternative 2 would be similar to those discussed for Alternative 1. Alternative 2 would require nearly 33,000 feet of conveyance of conveyance force main pipeline, and the construction of an additional conveyance pump station. These activities would require more soil disruption and could potentially provide a greater source of erosion and sedimentation.

The conveyance force main will cross a total of five streams between the Belfair UGA service area and the NB/CI facility. Stream crossings should be constructed in the manner described in Alternative 1.

Operational Impacts

Operational impacts would be similar to those of Alternative 1 with the exception that the spray irrigation of reclaimed water would occur over a 51-acre area at a rate of 0.61 inch per day. In addition, the reclaimed water could provide improved water quality for the unnamed stream, a tributary to Sherwood Creek that eventually discharges into Case Inlet just south of Allyn. Additional site-specific studies will be necessary to determine whether any augmentation of base flows and improvements to water quality would occur.

Alternative 3 – No Action Alternative

Under the No Action Alternative, there would be no construction-related impacts on shellfish resources. Continued reliance on on-site septic systems could lead to increased levels of nutrients, bacteria, and other chemicals reaching area surface waters as these systems age and become more susceptible to failure. The increased level of pollutants from on-site septic systems could adversely affect shellfish resources in the Lynch Cove/Hood Canal or North Bay/Case Inlet drainage areas by reducing overall water quality of the marine nearshore environment.

Cumulative Impacts

Operation of a new reclamation facility in the Belfair UGA would reduce the input of nutrients, bacteria, and other pollutants to marine waters (Lynch Cove), particularly along the marine shoreline areas and streams draining to these areas. Shellfish resources in the Lynch Cove/Hood Canal or North Bay/Case Inlet and their associated drainage areas would benefit from reduced inputs of excess nutrients, bacteria, and other pollutants from leaking septic systems, which have been linked to water quality problems throughout Puget Sound.

With the establishment of wastewater service, the Mason County Comprehensive Plan can be more fully implemented, which could result in an increase in new construction and ultimately an increase in pollution-generating impervious surface area within the basin. If stormwater resulting from new development is not adequately managed, water quality benefits provided by the removal of septic-related inputs could be offset by increased inputs from stormwater. Impacts to shellfish could continue to occur. Continued comprehensive watershed management will be needed to ensure that shellfish resources are protected.

Mitigation Measures

Described below are measures designed to minimize impacts to shellfish resources.

- Implement construction BMPs to avoid and minimize potential construction impacts, including erosion and sedimentation, accidental and incidental discharge of pollutants, and dewatering and discharge of dewatering water.
- Provide treatment of construction dewatering discharges, such as sediment removal or filtration, as necessary before the release of such water to wetlands or streams.
- Continue monitoring of receiving water quality in Lynch Cove to determine the effects of nutrient and bacterial reductions.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to shellfish resources are anticipated.

4.8 Energy

Affected Environment

This section discusses the current energy conditions in the Belfair area of Mason County, within the project vicinity. Applicable state and local regulations are summarized. Potential impacts that would occur with the construction and operation of the proposed reclamation facility, as well as potential mitigation measures, are described below.

Energy Supply in Project Vicinity

Mason County Public Utilities District No. 3 (PUD No. 3) provides electrical power to residents in the Belfair UGA, the LAMRID, and surrounding areas. PUD No. 3 purchases power from the Bonneville Power Administration (BPA) and distributes it to customers. The electrical power is carried by high-voltage (230,000-volt) lines to a neighborhood distribution substation located at SR 300 and NE Union River Road.

According to the PUD No. 3 2005 Annual Report, the utility provides electrical power to approximately 31,000 customers. In December of 2005, PUD No. 3 supplied a total of 619 million kilowatt hours.

BPA maintains a utility easement corridor to the southeast of the Belfair UGA. The reclamation facility and land application area for Alternative 1 occur along and within the BPA easement area.

Cascade Natural Gas Corporation provides natural gas throughout Mason County. Cascade Natural Gas serves approximately 1,450 commercial and residential customers in Mason County. Their storage facilities are located outside of Mason County at sites near Chehalis and Plymouth, and serve all of their system in Washington. A major supply line for the company runs through Mason County near the Belfair UGA. No specific system expansions are planned in Mason County at this time, but the company has a policy of expanding its supply system to serve additional customers.

Relevant Regulations

Washington State Energy Code

The Washington State Energy Code (Chapter 51-11 WAC) was adopted in 1990. It establishes building standards to promote the common use of energy-efficient building methods and to assure that such methods remain economically feasible and affordable.

The energy code is designed to require new buildings to meet a certain level of energy efficiency while allowing flexibility in building design, construction, and heating equipment within that framework. The standards primarily dictate requirements for building insulation and fuel efficiency for heat sources.

Local Building Codes

The building code of Mason County includes energy-efficiency standards for residential and non-residential buildings. Similar to state regulations, these standards dictate requirements for building insulation and fuel efficiency for heat sources. Under state law, all local jurisdictions must adopt the requirements of the Washington State Energy Code, although the code allows for local standards to prevail if they are more restrictive than the state standards.

Impacts

This section provides an overview of energy impacts that could be associated with each alternative. Water reclamation facilities and pump stations are relatively large consumers of electricity in rural areas. Amongst the facilities elements proposed under both Alternatives 1 and 2, the reclamation facility and pump stations would require the most significant energy use for ongoing operation. Most energy consumption at the existing NB/CI facility is electrical energy. Approximate monthly electrical consumption for Alternative 1 and Alternative 2 facility components are described in Table 4.8-1. Other facility components, such as odor control units and ventilation systems, have relatively minor energy requirements.

Table 4.8-1. Approximate Annual Energy Requirements for Alternatives 1 and 2

Alternative 1 - Belfair MBR		Alternative 2 - NB/CI	
Component	**KW-hrs / year**	**Component**	**KW-hrs / year**
Treatment	313,000	Treatment	313,000
Collection (PS2 & PS3)	33,000	Collection (PS2 & PS3)	33,000
Conveyance (PS1)	380,000	Conveyance (PS1&Conv PS)	433,000
Total	726,000	Total	779,000

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Construction-related energy impacts under Alternative 1 would include consumption of fossil fuels, electricity, and possibly natural gas during the construction period. Energy consumption would occur throughout the entire 18-month period of construction, varying with the intensity and type of the activity at any given time.

Reclamation Facility. Construction at the new reclamation facility near the Belfair UGA would occur for approximately 15 months. Construction-related energy impacts, however, would occur at higher levels during initial clearing, grading, and excavation activities. Excavation and construction of the reclamation facility would require investigation of natural gas pipeline locations in order to avoid temporary disruption of natural gas service. The primary energy consumed during the reclamation facility construction would be fossil fuels.

Conveyance Force Main. Construction of the force main would occur over an estimated 9-month period. During this period, temporary energy impacts would include consumption of fossil fuels and possible disturbances to natural gas pipelines during excavation for the conveyance force main trench. Approximately 4,000 cubic yards of excavation would be required for construction of the force main, significantly less than the 16,000 cubic yards estimated for Alternative 2. Natural gas utilities and other underground energy utilities within the conveyance corridor would be located prior to construction in order to avoid temporary impacts to service. Impacts would be temporary and are not expected to be significant.

Pump Station. Construction of the pump station would occur over a 9-month period. During this period, temporary energy impacts would include consumption of fossil fuels by construction equipment and electric energy consumption for other project activity. Natural gas utilities and other underground energy utilities within the pump station footprint would be located prior to construction in order to avoid temporary impacts to service. Impacts would be temporary and are not expected to be significant.

Land Application. Construction at the new land application site near the Belfair UGA would occur for approximately 6 months. Construction-related energy impacts, however, would occur at higher levels during initial clearing, grading, and excavation activities. Energy consumed would primarily be fossil fuels used by construction machinery and vehicles. Existing underground energy lines would need to be identified in the area of land application in order to avoid temporary impacts. Impacts would be temporary and are not expected to be significant.

Service Areas. Construction of the local conveyance system in the Belfair UGA and the LAMIRD would result in consumption of fossil fuels and electric energy to power construction equipment. Impacts would vary over time, depending on the intensity of construction activity within any given area. Excavation and construction would require investigation of natural gas pipeline locations in order to avoid possible temporary disruption of service. All impacts would be temporary and are not expected to be significant.

Operational Impacts

Power would be required to operate and maintain the reclamation facility, pump stations, and other system components. Energy demand would be dependant on the volume of wastewater conveyed and treated by the system. Increased development and wastewater generation would expand the energy demands of the Alternative 1 facility and pump station. Due to differences in conveyance force main length, the energy required conveying wastewater from the Belfair UGA and LAMIRD to the proposed Alternative 1 reclamation facility location would not be as great as conveyance energy requirements for Alternative 2 (as indicated in Table 4.8-1).

The water reclamation facility and pump station would both require back-up generators to ensure ongoing wastewater collection and treatment in the case of power outage. Generators would be fueled by fossil fuels, with a supply maintained onsite to facilitate at least 12 hours of operation. Fuel would be consumed both during power outage situations and during routine generator testing, typically completed on a monthly basis at reclamation facilities and pump stations.

Consistency with Adopted Regulations, Plans, and Policies. Mason County PUD No. 3 has indicated that capacity potential exists to accommodate the energy demands of the

Alternative 1 treatment and disposal system. All project components would be required to meet energy efficiency standards of the state and County.

Service Areas. Potential impacts within the Belfair UGA and LAMIRD are discussed below.

Belfair UGA. Increased density and development would likely occur in the area served by the sewer system. A trend toward urbanization in the Belfair UGA would result in increased demand and use of electric energy.

LAMIRD. Because the LAMIRD is approximately 80 developed, additional development within the LAMIRD is limited. Some additional energy demand would likely result from sewer service to the LAMIRD; however, this is not expected to be significant.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction impacts to energy resources are similar to those described above for Alternative 1. Construction periods for each of the Alternative 2 elements are anticipated to be similar to those discussed for Alternative 1. For example, expansion of the existing NB/CI facility would occur over a 15-month period and expansion of the existing NB/CI land application area would occur over a 6-month period. Energy impacts from construction of Alternative 2, however, would differ as described below.

The conveyance force main for Alternative 2 (Figure 3-3) would be approximately 33,600 feet in length, or 26,600 feet longer than the force main required for Alternative 1. Construction of the force main would be within existing road, railroad, and utility rights-of-way. However, the energy impacts of constructing the longer conveyance would be comparatively greater than conveyance construction under Alternative 1.

Operational Impacts

Operational impacts to energy are similar to those described above for Alternative 1. The longer conveyance force main and additional pump station, however, would require more energy to transport wastewater to the NB/CI reclamation facility. There would be no significant long-term impacts from the operation of Alternative 2.

Alternative 3 – No Action

Under the No Action Alternative, no construction-related impacts to energy would occur because no new reclamation facility would be constructed. Reduced potential for additional development within the Belfair UGA would create less demand for energy than is anticipated under both action alternatives.

Cumulative Impacts

The establishment of sewer service could facilitate development as is anticipated for the Belfair UGA within the Mason County Comprehensive Plan, potentially resulting in an increase in

energy demand. Mason County PUD No. 3 meets the energy demand of covered service areas as needed, based on current and predicted demand requirements. No significant cumulative impacts to energy service are anticipated with implementation of the project.

Mitigation Measures

During construction of the water reclamation facility, pump stations, and conveyance force main, best management practices (BMPs) would be implemented to minimize energy consumption. Construction-related BMPs used to minimize energy consumption typically include not allowing vehicles to idle and maintaining equipment in optimal working order.

Under either of the action alternatives, mitigation measures to control energy consumption would be considered and developed for each component of the water reclamation facility. Energy efficient equipment, including pumps, lighting, and electrical systems, would be selected for the pump stations and the reclamation facility. In addition, gravity flow will be used to convey wastewater wherever possible.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse energy impacts are anticipated from the operation or construction of Alternative 1 or 2.

4.9 Environmental Health

The following section describes the environmental health risks associated with existing and proposed methods of wastewater treatment in the project vicinity. Potential impacts that could occur with the construction and operation of the proposed treatment system, as well as mitigation measures, are discussed below.

Affected Environment

Existing Wastewater Treatment and Associated Human Health Issues

Currently, wastewater generated in the project vicinity is disposed to the subsurface via on-site septic systems. In 2002, the Washington Department of Health declared that the conditions present in Lynch Cove created a severe public health hazard, largely related to the number of on-site septic systems that were either failing or in suspect operational condition (Washington Department of Health, 2002). Implementation of the improved treatment system at Belfair State Park has resulted in water quality improvements in Lynch Cove. While water quality has improved throughout the Cove, and limited shellfish harvesting areas have been approved, the Department of Health has not lifted the severe health hazard declaration.

Bacterial or viral illnesses caused by wastewater-contaminated groundwater and surface water typically involve gastrointestinal problems that are attributed to "the flu" or other non-specific causes as well as specific illnesses (hepatitis A). *Cryptospiridium*, *Giardia*, and *Entamoeba* are single-celled protozoan parasites that can be spread through the improper disposal of wastewater. Because of their large size relative to other microorganisms, they are not considered to be highly mobile in most soils. Health risks can occur through transmission of bacteria and viruses from wastewater into receiving waters.

A major consideration in the land application of reclaimed water is the potential presence of chemical and microbial agents in source water that could be hazardous to human health. This is particularly true for water intended for potable use (drinking water); there is less potential for exposure and the risks are lower for non-potable use. The four water quality factors generally of concern for human health are human pathogens (particularly microorganisms), mineral content, heavy metals, and trace organic compounds. There are three main groups of microorganisms that can be transmitted through water consumption: bacteria, viruses, and protozoa.

The treatment processes to produce Class A reclaimed water have been shown to be very effective barriers against contaminant passage, including viruses. Ultraviolet (UV) disinfection is the proposed disinfection method for the project. It is a rapid disinfection process that blocks replication of microorganisms and eliminates the need for handling hazardous chemicals. It produces no undesirable by-products. While effective for bacteria and viruses, protozoa are generally more resistant to both chlorine and UV.

Human health can also be affected by metals, organic chemicals, and nutrients present in untreated wastewater, but symptoms generally take a longer time to materialize. Nitrate is a nutrient that is a specific health concern because high levels in drinking water can cause

methemoglobinemia, a condition that develops when nitrate enters the human body, converts to nitrite, and interferes with the blood's oxygen-carrying capacity.

Health risks can occur through transmission of bacteria, viruses, and the other constituents from wastewater into receiving waters. These contaminants can be transmitted to humans via ingestion or direct water contact (e.g., swimming, wading). In groundwater, these contaminants can be transmitted to humans through drinking water systems. In marine waters, fish and shellfish can bioconcentrate bacteria and viruses, which, if consumed by humans, can cause illness. One such illness caused by ingestion of infected organisms is *Vibrio parahaemolyticus*.

Some chemicals can also be endocrine disruptors when they are present in sufficient volumes and concentrations. Endocrine disrupting compounds (EDCs) are a broad group of natural and synthetic organic compounds that can block or mimic normal receptor-activating hormones in animal endocrine systems. EDCs come from many different sources and represent many classes of chemical compounds. EDCs such as estrogens are byproducts of pharmaceuticals. EDCs such as nonylphenol, alkyphenol ethoxylates (APEs) and phthalates are byproducts of manufacturing and some agricultural applications, and are often found in common household items, such as detergents, cosmetics, personal care products, and plastic items.

At present there is no conclusive evidence of the negative effects of endocrine disrupting chemicals on humans. These chemicals, also called hormonally active agents, can influence the endocrine systems of certain organisms.

Wastewater Spills, Leaks, or Ruptures

The potential for human contact with wastewater may result from releases caused by pipeline breakage or pump station overflow. Pipeline breakage can result from natural causes, such as earthquakes, or from human causes, such as dislodgement during excavation for new construction. Pump station overflow may result from catastrophic system failure, excessive inflow to the pump station, or debris blocking outgoing pipes or force mains. These types of incidents are rare, but they do occur.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Construction Impacts

The potential for worker contact with untreated wastewater is minimal during construction as there would be no wastewater in the system until construction is complete.

Accidental Spills during Construction. Impacts as a result of construction-related spills and other emergencies are expected to be minimal. The risks of spills during construction of wastewater treatment facilities and associated pipelines are similar to risks posed by other large construction projects. Spills of fuels, oils, lubricants, or other substances can occur during transport or on-site during construction. Construction plans would include spill containment provisions and response kits to prevent off-site transport of spilled materials, but construction workers could still potentially come in contact with a spilled fuel or hydraulic fluid.

Operational Impacts

Because of the high quality of treated water being produced at the reclamation facility, the safety and redundancy features incorporated into the design of the proposed facilities, and the use of standard safety procedures, impacts to environmental health related to the operation of Alternative 1 are expected to be minimal.

Discharge of Treated Water during Operation of Reclamation System. The potential human health risks associated with Class A reclaimed water being land applied are generally related to three constituents of concern: (1) bacteria, viruses, and other pathogens; (2) metals and organic chemicals; and (3) nutrients. Technology-based effluent limits for municipal wastewater treatment plants must comply with Section 40 CFR Part 133 and WAC 173-221. These regulations set limits for water quality parameters.

The water reclamation facility would meet all permit requirements developed for the protection of human health and the environment. These requirements would comply with water quality standards in effect at the time of permit issuance. The membrane bioreactor (MBR) selected for the reclamation facility is the best available technology for treating municipal wastewater and removing the constituents of concern.

The water reclamation facility would utilize ultraviolet (UV) light for disinfection to respond to concerns about bacteria and other pathogens. Permit requirements stipulate that the total bacteria organism count should not exceed the most probable number (MPN) of 2.2 per 100 milliliters (ml). This level meets the guidelines published by the Washington Departments of Health and Ecology (September 1997). The UV disinfection process would kill nearly all microorganisms remaining in the water after the MBR process.

Currently, state and federal water quality standards and criteria do not consider endocrine disruptor effects. MBR treatment would remove a percentage of suspected endocrine disrupting chemicals (EDCs). Despite treatment, some potential endocrine disruptors may pass through the treatment system and be land applied (Stahlschmidt-Allner et al., 1997; Ternes et al., 1999). The potential effects of these chemicals on animals, including humans, are uncertain. Both national and international research is being conducted on this issue.

Accidental Spills during Operation. Wastewater reclamation facilities, pipelines, and pump stations are designed and constructed to withstand conceivable stresses including earthquakes, loads from the surface, and soil instability, thus reducing the risk of leaks and ruptures. A break or rupture in a pipeline, or pump station overflow, may result in the release of wastewater to underlying groundwater or to a nearby surface water body, thereby becoming a potential health risk. The extent of the risk would depend upon the volume of flow and location of the rupture relative to human exposure pathways. The areas most sensitive to a pipeline break or overflow include areas adjacent to a public water supply well, densely populated residential areas, and Hood Canal or other water bodies with high numbers of recreational users.

The risk of a chemical spill during operation of the water reclamation facility would be minor with the safety measures incorporated into the design of the reclamation facility and appropriate handling procedures. The greatest potential risk would be to reclamation facility operators.

Emergency spill response procedures would be in place at the facility, and employees would be trained to respond.

Land Application of Reclaimed Water. During land application of wastewater, any microorganisms in the wastewater are released into the environment. If pathogenic microorganisms are present there is some potential for individuals to be exposed to these organisms (Hardy et al., 2006). However, a recent study conducted by the Idaho Department of Environmental Quality (February, 2006) noted that droplets larger than 0.2 millimeters (200 micrometers) do not transport significantly beyond the application area. Because the area surrounding the application site is forested, the potential for individuals to come into contact with the reclaimed water during application is minimal.

As a result of the high level of treatment described above, the risk to groundwater quality and public health associated with the land application of Class A reclaimed water is expected to be minimal.

Service Areas. There is an existing potential risk of bacterial, viral, and nutrient contamination of groundwater from the use of on-site septic systems in the Belfair UGA and LAMIRD. This potential would be reduced, particularly in Lynch Cove and the North Shore area, when these areas are converted to sewers and the on-site septic systems are decommissioned.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction-related and operational environmental health impacts associated with Alternative 2 would be the same as those described for Alternative 1.

Alternative 3 – No Action

With no construction activity for the proposed wastewater system, no additional environmental health impacts would be expected. The potential impacts related to operation of a reclamation facility and associated structures would be avoided.

Under the No Action Alternative, on-site septic systems would continue to be used in the service area, and would increase within the Belfair UGA. The majority of growth and concomitant increased on-site septic system usage within the Belfair UGA would occur sporadically. As the number of systems increases, and as these systems age, there is a higher potential for system failure and increased potential of bacterial, viral, and nutrient contamination of surface and groundwater in the urban area. This could continue to increase the public health risks identified by the Washington State Department of Health in 2002.

The increased use of on-site septic systems represents the potential for increased contaminant loadings to groundwater, and therefore drinking water supplies. The risk is of concern because groundwater is the primary source of drinking water for Mason County.

Mitigation Measures

The MBR selected for the reclamation facility is the best available technology for treating municipal wastewater. Wastewater would be treated to meet or exceed all applicable water

quality standards and to comply with permit requirements. These standards and requirements are designed to protect human health and the environment.

The following measures have been identified to reduce environmental health-related impacts associated with Class A reclaimed water production and land application.

- Strict adherence to wastewater treatment standards would significantly reduce the potential for drinking water supply contamination.
- Application of Class A reclaimed water at agronomic rates will further reduce the potential for groundwater quality impacts.

The following measures could be used to minimize the risk of and respond to accidental leaks or spills during operation of the reclamation facility:

- Incorporate measures including spill containment provisions, double-walled storage facilities, and emergency cleanup procedures into the design of the facility.
- Develop emergency response programs in cooperation with the local fire district and emergency service providers.
- Design force mains to withstand operating and transient pressures in accordance with American Water Works Association design criteria and Ecology's *Criteria for Sewage Works Design* (Ecology, 1998).
- Develop security and emergency response measures and protocols for the reclamation facility to protect against unauthorized entry. These measures could include restricted access, fencing, controlled visitor access, and security cameras.

The following measures could be used to minimize the environmental health impacts associated with Alternative 3 - No Action.

- On-site sewage systems should be designed, constructed, and maintained to minimize the potential for groundwater quality impacts.
- Siting densities should be no greater than soil and groundwater conditions allow.

Significant Unavoidable Adverse Impacts

Significant unavoidable adverse environmental health impacts are not anticipated with Alternatives 1, 2, or 3, assuming facilities are properly designed and operated.

4.10 Land and Shoreline Use

Affected Environment

Setting

Mason County includes approximately 620,067 acres of land. Resource lands such as designated long-term commercial forestlands, national park land, and national forestlands account for approximately 57 percent of the land within Mason County. The remaining lands in Mason County are predominately rural. Typical land uses in the rural areas of the County include rural residential, farming, forestry, recreation, single-purpose commercial, retail, and industrial uses. Urban growth areas (UGAs) located in Mason County include the City of Shelton and unincorporated Allyn and Belfair.

The project vicinity is located in the northeast portion of unincorporated Mason County and includes the Belfair UGA. The Belfair UGA covers approximately 2,400 acres and includes a mix of residential, commercial, industrial, civic, and public uses. Outside of the Belfair UGA, rural residential and small-scale agriculture (including small-scale private forestry) are the predominant land uses in the project vicinity.

Population

As of 2000, the population for the County was reported by the Office of Financial Management (OFM) at 49,985, a 28.9 percent increase since 1990 (Mason County, 2005). The majority of Mason County's population increase comes from migration within the state. The County expects a high growth rate to continue when planning to accommodate the needs for future population. An increase in development is expected as property owners retire away from metropolitan areas; therefore, the County anticipates a higher conversion of seasonal residences to year-round residences. In addition, telecommunications technology makes it possible for greater numbers of people to live in rural environments and work remotely from home.

Based on OFM projections, population in Mason County will be 64,007 by the year 2015 and 75,088 by 2025 (Mason County, 2005). The County has estimated how the future growth in population will be distributed among the different land use districts. Table 4.10-1 presents the additional population levels and the share of County growth that would be experienced in each of these areas in the year 2025.

Table 4.10-1. Area Growth Projections for Mason County 2005-2025

Area	Share of Growth	Additional Population
Shelton Urban Growth Area	33%	10,500
Belfair Urban Growth Area	18%	5,600*
Allyn Urban Growth Area	7%	2,250
Rural Lands	37%	11,480
Other land use districts (e.g., Rural Activity Centers, Fully Contained Communities)	4.5%	1,469
Total County	100%	31,299

Source: Mason County Comprehensive Plan; Table IV2-15 (2005)
* Current population in the Belfair UGA is approximately 900.

Relevant Policies and Regulations

The Washington State Growth Management Act (GMA), Mason Countywide Planning Policies, and Mason County's Shoreline Master Program set the general framework for planning for growth and the siting of public facilities and utilities to service that growth. The comprehensive plans and zoning and development codes of Mason County are the primary regulations for site-specific land use and development.

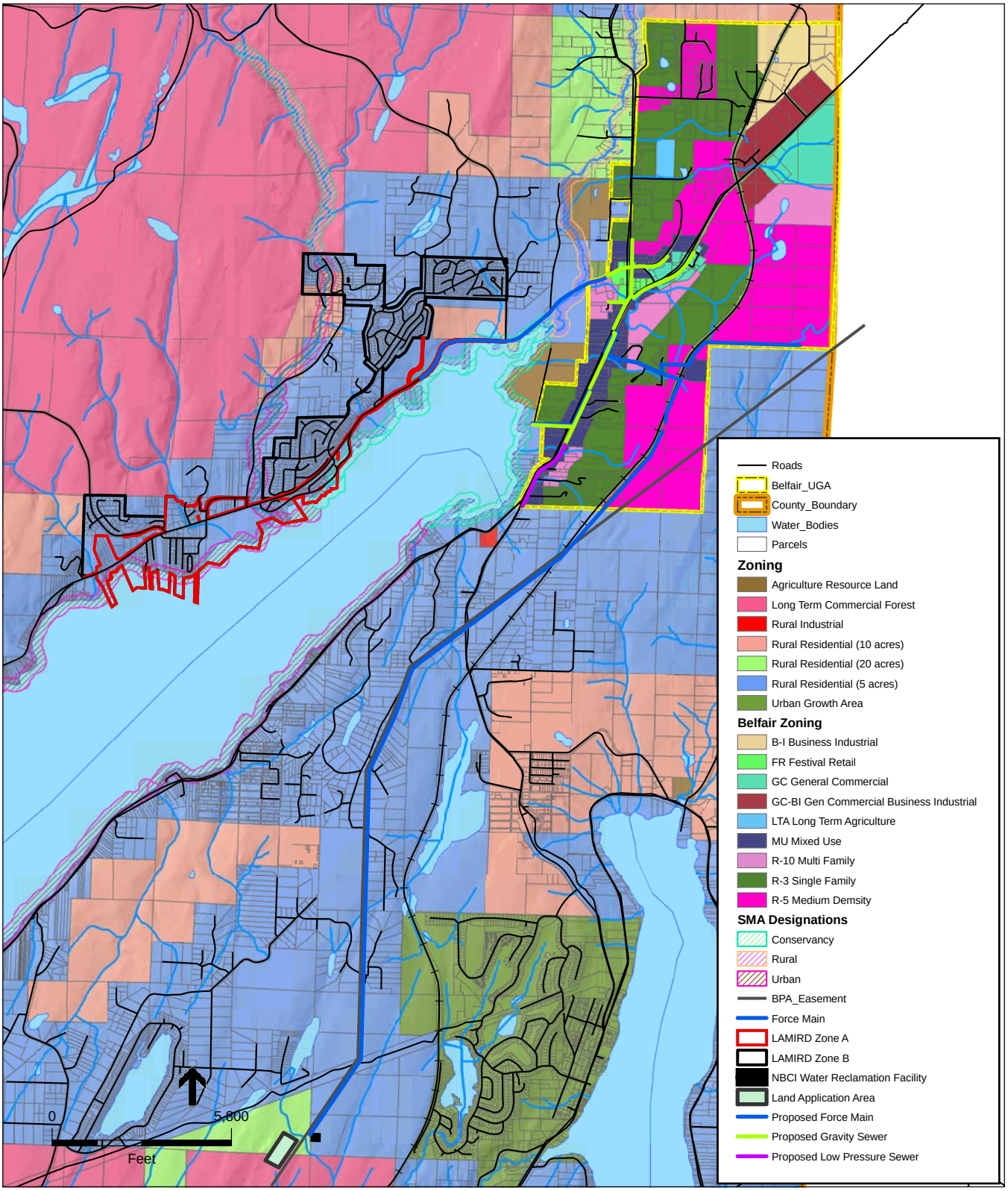
Figures 4.10-1 show zoning and Shoreline Master Program designations in the vicinity of project components under Alternatives 1 and 2.

Washington State Growth Management Act

Growth management is intended to serve as the integrating framework for community planning and land-use related laws. The GMA, enacted in 1990, requires that local government plan extensively in keeping with state goals, including those for economic development and provision of public facilities and public services. However, other GMA goals make clear that urban development should occur in urban, not rural, areas and that sprawl should be reduced. Counties must balance growth with the need to protect rural character.

Rural lands are those lands in a county that have not been designated as natural resource lands of long-term commercial significance and have not been designated for urban growth. Rural lands do not include incorporated rural towns or cities, but can include existing rural communities that have not been incorporated. County planning for development in rural areas needs to include goals and policies to provide for a variety of rural densities and to protect rural character.

Many developments were built in rural areas before the adoption of county comprehensive plans. Existing developments may be located in unincorporated towns, areas that have grown up around shoreline areas, sprawling low-density subdivisions, or widely scattered subdivisions. These developments may or may not be served by sewer, water, fire protection, and other public services. Counties have struggled with the issue of what to do about existing areas of development in light of the need to provide certain services, prevent further sprawl, protect the remaining rural character, and protect public health and the environment.



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 4.10-1

Belfair/Lower Hood Canal Water Reclamation Facilities

Area Zoning

In response to a concern that the GMA did not clearly state what type of development is appropriate in rural areas, additional statutory guidance was provided in 1997. In addition, optional tools for reconciling past development and allowing limited residential and economic development were also provided. Designating Limited Areas of More Intensive Rural Development (LAMIRD) in areas where development already exists was one of those options.

LAMIRD. "Limited Areas of More Intensive Rural Development" or LAMIRDs are a rural land use designation, enabled under 36.70A(5)(d). LAMIRDs may include necessary public facilities and public services to serve the limited area provided they are provided in a manner that does not permit low-density sprawl.

There are three types of LAMIRDs, each authorizing a different category of rural development. The types refer to the subparts of RCW 36.70A.070(5)(d) that authorizes them. A Type 1 LAMIRD, authorized by RCW 36.70A.070(5)(d)(i), designates existing areas of commercial, industrial, residential, or mixed-use development. A Type 2 LAMIRD, authorized by RCW 36.70A.070(5)(d)(ii), allows small recreational and tourist businesses to develop and grow. Finally, a Type 3 LAMIRD, authorized by RCW 36.70A.070(5)(d)(iii), allows for the growth and new development of isolated cottage industries and small-scale businesses. Public facilities and services necessary to serve the LAMIRD may be provided to these areas.

Type 1 LAMIRD and Logical Outer Boundary Requirements

The basic intent of the Type 1 LAMIRD designation is to acknowledge those existing areas in the unincorporated rural area that are characterized by a more intense mix and pattern of land use, and to allow for some redevelopment and infill consistent with the rural character as reflected by the size, scale and intensity of development and the availability of rural services and facilities to serve the development.

Defining attributes of a Type 1 LAMIRD can include such things as small lots, commercial establishments, public/governmental facilities, industry, and other such uses that alone or in combination area generally not considered rural. While Type 1 LAMIRDs are identified as areas with infrastructure that can absorb some of the growth (along with county UGAs), the growth capacity of these areas is a byproduct of establishing boundaries and not a criteria for those boundaries. Rather, the purpose of the Type 1 LAMIRD boundaries is to contain existing patterns of development that are more intensive than what is typically rural, while allowing for some opportunities for redevelopment and infill.

Identification of Type 1 LAMIRD includes the following statutory requirements:

- The area is already developed (as of the date the County was required to plan under GMA) or directly associated with such lands.
- Limited public facilities already exist.
- Means can be identified to avoid intrusion of more intensive activities into undeveloped areas.
- Means can be identified to protect ground and surface water.
- Means can be found to protect resource lands and activities.

Counties are directed to adopt measures that minimize and contain the existing areas or uses of more intensive rural development. The Type 1 LAMIRD requires the establishment of logical boundaries to minimize and contain these areas of more intense rural development. Lands included in such existing areas are not to extend beyond a logical outer boundary, which could introduce a new pattern of low-density sprawl into the rural environment. GMA provides statutory guidelines for establishing the boundaries of these areas (RCW 36.70A(5)(d). They include the following considerations:

- Existing areas are those that are clearly identifiable and contained and where there is a logical boundary delineated predominately by the built environment.
- The need to preserve the character of existing natural neighborhoods and communities.
- Physical boundaries such as bodies of water, streets, and highways, and land forms and contours.
- Prevention of abnormally irregular boundaries.
- Ability to provide public facilities and public services in a manner that does not permit low-density sprawl.
- An existing area or existing use is one that was in existence as of the date the county is required to plan under GMA (July 1, 1993).

Once designated, the boundaries of a Type 1 LAMIRD cannot be expanded. Demand or need for residential development does not permit the expansion of LAMIRDs beyond their logical outer boundaries.

Establishment of a LAMIRD is being proposed for the North Shore area.

Mason County Policies and Regulations

The Mason County Comprehensive Plan (2005) policies place a high priority on the development of wastewater treatment facilities. There are a number of county planning policies relating to land use, as well as utilities relating to this providing wastewater service to the Belfair UGA and to the North Shore LAMIRD Zones A and B. Some of these relevant Comprehensive Plan policies are listed in Table 4.10-2. Policies relating specifically to LAMIRDs are included in Table 4-10-3.

Table 4.10-2. Mason County Comprehensive Plan Goals and Policies

Policy No.	Text
Essential Public Facilities	Facilitate the siting of Essential Public Facilities sponsored by public or private entities within unincorporated areas where appropriate.
CF-401	Identify and allow for the siting of Essential Public Facilities according to procedures established in this plan.
Wastewater/Sanitary Sewer	Assure that wastewater facilities necessary to carryout out comprehensive plan are available when needed, and finance these facilities in an economic, efficient, and equitable manner.
CF-501	Maintain a safe, efficient, and cost-effective sewage collection and treatment system.
F-502	Require all new development within designated UGAs and rural activity centers to connect to existing or proposed public sewer systems. Public sewer systems are those

Policy No.	Text
	owned and operated by any legally recognized municipal organization as public utility.
CF-503	Allow existing single-family homes with septic systems to continue to use septic systems that conform to existing standards. Replace deficient septic systems in a timely fashion.
CF-505	Eliminate any unlicensed point or non-point pollution sources associated with sewage transport and disposal.
Planning Policies	Mason County's Comprehensive Plan includes extensive guidance about development.
GLU 6	Establishes Belfair as an Urban Growth Area.
GLU 14	Ensure that urban areas have urban services. If the unincorporated UGA has sewer service, existing legally platted lots may develop consistent with regulations. If the UGA is without sewer service, existing legally platted lots may develop consistent with County Health Department regulations for on-site septic systems.
Facilities/Services	GMA strives to ensure that public facilities and services necessary to support development shall be adequate to serve the development at the time of occupancy without decreasing the level of service provided.
CWPP 3.10	Recognizes tight line sewer systems when needed for public health.
CWPP 4.1	Ensure that those public facilities and services necessary to support development shall be adequate to serve the development at the time of occupancy without decreasing current levels below locally established minimum standards.
CWPP 4.3	Sharing of corridors for major utilities, trails, and other transportation rights of way is encouraged.
Capital Facility Policies	
U-202	The County should define the levels of service necessary to support urban levels of development in the UGA.
U-204	Facilities and services in the Belfair UGA should be sufficient to accommodate seasonal increases in population.
BUGA 5	Assure the orderly transition from rural to urban uses for Belfair by; • Phasing sewer provision; • Allowing urban development based on sewer provision; • Allowing appropriate transitional development in areas where sewers will be provided; • Allowing rural densities and development in areas which cannot meet transitional development standards.
BUGA 5a	In areas within the UGA, where public sewer and water are not available,
BUGA 6	Designate a Phase 1 sewer provision area that includes the downtown core of Belfair. This area is where sewer should be provided first. Encourage urban development of mixed uses to locate there, based on provision of services, good site design, and adequate transportation facilities.
BUGA 7	Designate a Phase 2 sewer provision area located outside the downtown core of Belfair. This are is intended to be provided with sewer service after Phase 1 is serviced.
Belfair UGA Plan Policies	
W-1	Install sanitary sewer trunk line within the next 5 years.

Several Mason County development regulations would affect this proposal. Essential Public Facilities, such as wastewater treatment facilities, require a Special Use Permit in the County's rural zones. Underground utility facilities within public rights-of-way are not regulated by the

Mason County zoning code. However, a right-of-way permit, ensuring safety and coordination, is required from the County Public Works Director. Grading and building permits will also be required from the County.

The County's Shoreline Master Program (2003) provides for the management of the County's shorelines by fostering all reasonable and appropriate uses. The Mason County shoreline environments in the project study area are defined as follows:

- **Urban Residential** areas are intended to have optimum utilization of the shoreline for residential development. This designation is appropriate for areas presently under intensive development pressure, as well as areas planned to accommodate future urban growth.
- **Conservancy** areas are intended to protect, conserve, and manage existing natural resources and valuable historic and cultural areas in order to ensure recreational benefits to the public and to achieve sustained resource utilization.

Critical areas (e.g., wetlands, streams, geologically hazardous areas) are located throughout the County and the project vicinity. For any disturbance in critical areas and their buffers by any of the reclamation facilities, Mason County Critical Areas Code (MCC Chapter 17.01) would require a Critical Areas Review and a Mason Environmental Permit (MEP). This review entails critical area special studies and conditions on permits for mitigation, maintenance, monitoring, and contingencies. Refer to Section 4.5, Biological Resources for additional information.

Chapter 17.01, Geologically Hazardous Areas, of the Mason County Resource Ordinance (MCRO) establishes regulations for the protection of sensitive areas, including geologic (seismic), landslide, erosion, and steep slope hazards (Mason County, 2006). In addition to fulfilling the mandates of the GMA, its primary purpose is to fulfill the legislative intent of Mason County to protect the public health, safety, and welfare of the citizens. This section of the MCRO establishes prohibitions, mitigation requirements, and minimum standards for the use and development of properties that contain or adjoin these sensitive areas.

Mason County LAMIRD Policies

The Mason County Comprehensive Plan (2005) includes policies relating to the purpose, intent and criteria to establish a LAMIRD. Selected relevant Comprehensive Plan policies relating to LAMIRDS are listed in Table 4.10-3.

Table 4.10-3. Mason County Comprehensive Plan LAMIRD Policies

Policy No.	Text
GLU 17	Designate LAMIRDs with established development patters that meet the criteria and guidelines of RCW 36.70.070 (5) (d).
GLU 18	Establish measures to ensure that LAMIRD boundaries do not extend beyond logical outer boundaries of the area.
GLU 19	Ensure that RACs continue as LAMIRDs, with little or no growth directed toward them but with existing uses within them considered conforming.
RU 100-130, 521	Establishes a Rural Residential LAMIRD land use designation, located in limited and well defined areas where land is already platted and developed.

In Mason County, rural lands are divided into several performance districts. These rural land performance districts include LAMIRDs, Fully Contained Community (FCC), Master Planned Resort (MPR), and Rural Area (RA). The LAMIRD performance district, formerly known as "general Rural Lands," includes land use designations such as Rural Activity Centers (RAC), Hamlets, Rural Commercial/Industrial Areas, and Rural Tourist/Recreational Areas. Rural Activity Centers in Mason County include Union, Hoodsport, and Taylor Town. Hamlets in Mason County include Bayshore, Dayton, Deer Creek, Grapeview, Lilliwaup, Matlock, Potlatch, Spencer Lake, and Tahuya.

Establishment of a LAMIRD in the North Shore would require changing the existing designation from Rural Residential to a LAMIRD-Rural Activity Center. This would change the underlying zoning of the residential areas from RR 5 to RR 2.5. Most of the existing parcels within the LAMIRD Zones A and B are currently much smaller than 2.5 acres.

Alternative 1 – Reclamation Facility near Belfair

Reclamation Facility

The site for the new water reclamation facility is located east and south of the Belfair UGA on land privately owned by Overton & Associates (a forest management company). This area is a managed commercial forest and is restricted from general public access. The site is surrounded by timbered and logged lands under the same ownership. Bonneville-Power Administration (BPA) transmission lines are located on an easement adjacent to the site. There are no structures located on or near the site. The County's Comprehensive Plan designation for the site is Rural Area.

The site is zoned Rural Residential 5 (RR 5 – minimum 5 acres). Adjacent properties are also zoned RR 5. The RR 5 zone is established primarily to accommodate single-family residential and hobby farms (small-scale agriculture including wood lots). Other permitted uses in this zone include churches, local community and recreation centers, group homes, cell towers, fire stations, fish hatcheries, and public utilities (MCC 1.04.222). Essential Public Facilities are allowed in RR 5 zones through a Special Use Permit. Wastewater/sanitary treatment facilities and systems are included in the definition of Essential Public Facilities (MCC 17.06). While building regulations under this zone place a maximum building size of 3,000 square feet and a

35-foot height limit, Essential Public Facilities may exceed these limits if approved under a Special Use Permit.

Property further to the south is zoned Rural Residential 10 Acres (RR 10). Property further to the west and north is located within the Belfair UGA and is zoned medium density residential (R-5). Property to the east is located in Kitsap County and is zoned Interim Rural Forest (1 dwelling unit per 20 acres). These surrounding lands are currently managed commercial forests. The site is not located near any shoreline regulated under the County's Shoreline Master Program.

Land Application Area

The land application area for the reclaimed water produced under Alternative 1 would be located on a 33-acre forested site near the location of the proposed reclamation facility. As discussed, this location is east and south of the Belfair UGA in an area of logged and forested commercial forestland. Surrounding lands within at least 1,000 feet in each direction are also commercial forestlands. There are no structures located on or near the site. The County's Comprehensive Plan and zoning designations for this area are the same as described above for the reclamation facility site. The site is not located near any shoreline regulated under the County's Shoreline Master Program.

Service Area

Belfair UGA. Unincorporated Belfair UGA is the primary commercial center in the northeast corner of Mason County and covers approximately 2,400 acres. The commercial area is located along a three-mile corridor of SR 3. Belfair currently contains fewer than 300 residential units. These uses are scattered mostly along the SR 3 corridor west of the railroad and in the vicinity of Old Belfair Highway in the northwest portion of the UGA. Most of the areas surrounding the main commercial and residential corridor contain low-density development. While vacant or redevelopable land is available in these low-density areas of the UGA, commercial and residential development opportunities are currently limited due to the lack of sewer service. Industrial uses are mostly located to the west of SR 3.

Forestry represents the primary current land use within the Belfair UGA, encompassing more than 877 acres, and accounting for approximately 40 percent of the area's total land. Of the 1,319 acres of non-timber lands, approximately 34 percent (or 451 acres) are currently unimproved (Mason County, 2005).

The current population within the UGA is approximately 900. However, Belfair serves residents within a larger rural geographic area with a population of approximately 23,000 as well as tourists. The Belfair UGA experienced very low growth in the past decade, while rapid growth occurred in the rural areas outside the UGA (ECONorthwest, 2003). New land use policies, related to GMA, suggest that growth will come to Belfair UGA at a higher rate than previously experienced. Substantial increases in population and land use activities are expected within the UGA boundaries over the next 20-plus years (refer to Table 4-10.1).

LAMIRD Zones A and B. The purpose of the LAMIRD designation would be to allow very limited centralized wastewater treatment service for existing North Shore developments that have likely contributed to the declaration of a severe public health hazard in Lynch Cove, along with other water quality problems including low dissolved oxygen.

The LAMIRD has been identified for phased implementation. As described in Chapter 3.0, the first phase, designated LAMIRD Zone A in this EIS, would be connected to the wastewater reclamation facility at the same time as the Belfair UGA. The area included in LAMIRD Zone A was identified as having a high probability of contributing to bacterial water quality contamination in Lynch Cove (AESI, 2005). This area includes approximately 265 acres on the developed portion of the North Shore lowland area that parallels the Hood Canal waterfront along North Shore Road (SR 300) from near the Union River to approximately 0.75 mile southwest of Belfair State Park. This area is developed at relatively high densities with septic systems.

All of the LAMIRD Zone A is currently zoned Rural Residential 5 (RR 5 - minimum 5 acre parcels), though lot sizes are generally much smaller than 5 acres as a result of plats created prior to the enactment of GMA and County zoning requirements. Lots smaller than 7,000 square feet are common. Several light-industrial and commercial businesses and Belfair State Park are located in LAMIRD Zone A. A parcel analysis of properties within Zone A and Zone B demonstrates historic lot patterns prior to 1990 substantially smaller than five acres and approximately 80% of those lots developed with residential structures, also prior to 1990.

Under the County's Shoreline Master Program, the LAMIRD Zone A is designated urban residential shoreline environment east along the shoreline to the Red Barn Restaurant. The minimum lot size for shoreline urban residential areas is 12,500 square feet. One accessory unit per residential lot is allowed with a minimum lot size of 18,750 square feet. Multi-family residences are permitted, subject to a maximum projected output of 1,570 gallons of sewage per acre per day. While the shoreline regulations would allow development on a parcel as small as 12,500 square feet (or 18,750 for an ADU), the lot owner would not be allowed to subdivide and create new 12,500 square foot lots, as any new lot created would have to meet the proposed zoning size requirement (2.5 acres). The shoreline from east of the Red Barn Restaurant along Lynch Cove is designated "conservancy" environment. Conservancy environment designations allow for one residential unit for every 5 acres and 200 lineal feet of shoreline.

The area designated LAMIRD Zone B includes approximately 465 acres of clustered areas of existing development along the upland slope and plateau north of SR 300 including the Mission Creek, Beards Cove, View Ridge Heights, and Lynch Cove communities. These areas have been identified as having a possible contribution to bacterial contamination in Lynch Cove. However, further assessment of this area is required to determine whether it is actually contributing to water quality problems. The LAMIRD Zone B area would continue to be evaluated for the potential to contribute to water quality problems in Hood Canal, and if studies indicate that this area is contributing to bacterial and/or nutrient contamination, options for improved wastewater management could be considered. These options could include connection to the centralized wastewater reclamation facility, or other options such as clustered on-site systems, enhanced individual on-site systems, or some other enhanced decentralized approach.

Lot sizes in LAMIRD Zone B are also generally much smaller than 5 acres due to the creation of plats prior to zoning requirements. RR 5 is the predominant zoning in the LAMIRD Zone B area. A small portion of LAMIRD Zone B is zoned RR 10 (minimum 10-acre parcels). Upon approval of the LAMIRD, zoning would be RR 2.5

Several studies have been completed to characterize current conditions and evaluate wastewater management scenarios. These include the *Lynch Cove/North Shore Sewer Service Area Delineation Study* (AESI, 2005), *Enhanced Parcel Overlay Mason County North Shore Area* (Adolfson Associates, Inc., 2006), and the *Evaluation of North Shore Wastewater Management Scenarios* (MSA, 2006). Based on the Service Area Delineation determinations of suitability for on-site sewage treatment (AESI, 2005) and the results of MSA (2006) parcel analysis, approximately 80 percent of the parcels in the LAMIRD Zones A and B areas are currently developed. Many of the developed and vacant parcels may not have adequate area to accommodate the proper installation of advanced on-site septic systems (MSA, 2006).

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

North Bay-Case Inlet Reclamation Facility

The North Bay/Case Inlet (NB/CI) reclamation facility is located on a 39-acre parcel at 1001 Reclamation Ridge Road in the eastern portion of unincorporated Mason County. The site is surrounded by commercial forestlands to the north, east, and south and a BPA transmission line easement to the west. The County's Comprehensive Plan designation for the site is Rural Area.

The site is zoned Rural Residential 5 (RR 5). Adjacent properties to the north and east are also zoned RR 5. As described above for Alternative 1, Essential Public Facilities are allowed in RR 5 zones through a Special Use Permit. Property to the south is zoned Long-term Commercial Forest (LTCF) and property to the west is zoned Rural Residential 20 (RR 20). The Allyn UGA is located approximately one mile to the east. The site is not located near any shorelines regulated under the County's Shoreline Master Program.

Land Application Area

The land application area for the reclaimed water produced under Alternative 2 is currently owned by Cascade Natural Gas and located to the southwest of the reclamation facility. The County's Comprehensive Plan designation is Rural Area and zoning designations for this area are RR 20 (minimum 20 acres) and Long-term Commercial Forest (LTCF). The site is not located near any shorelines regulated under the County's Shoreline Master Program.

Service Area

The area served by this alternative would be the same as described above for Alternative 1.

Impacts

Alternative 1 – Reclamation Facility Near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair. Additional site-specific environmental analyses as well as local permits would be required prior to the construction of the reclamation facility, conveyance, and land application components.

Construction Impacts

Reclamation Facility. An estimated 15 acres of land would be required for construction of the reclamation facility, including the area needed for holding ponds. Construction impacts on adjacent land uses would generally include dust, noise, and construction traffic. These impacts would be temporary, occurring during the estimated 15-month construction duration. Surrounding land use is commercial forestry; therefore, no sensitive receptors would be affected by construction on the site. Refer to the Air, Noise, and Transportation sections of this Draft EIS for additional discussion.

The property proposed for the reclamation facility is currently used for commercial forestry. To develop the facility, Mason County will need to acquire the property.

It is anticipated that construction of the facility can be accommodated outside of regulated critical areas associated with Coulter Creek. No shoreline areas would be affected. Refer to Section 4.5, Biological Resources, of this Draft EIS for additional discussion.

Conveyance Force Main. Construction of the conveyance force main from the pump station to the reclamation facility would also result in temporary land use impacts, generally consisting of dust, noise, and construction traffic, as well as possible temporary restriction of access to properties located in construction areas. Refer to the Air, Noise, and Transportation sections of this Draft EIS for additional discussion.

All of the required conveyance force main would be built within easements, along existing roads and rights-of-way. Public concern is anticipated to be the greatest through residential areas, although businesses in commercial and industrial areas could be temporarily disrupted through restriction of access. Pipeline installation would proceed at a rate of approximately 100 feet per day; therefore, the duration of impact at any one location would be short. Trenchless technology will be used for the majority of construction along highways, which will minimize impacts. Although construction could create disruptions by temporarily limiting property access, these impacts will not have any long-term effect. Construction would adhere to prohibitions, mitigation requirements, and minimum standards for conveyance line construction on properties that contain or adjoin County regulated critical areas. No shoreline areas would be affected.

Pump Station. One pump station will be necessary to transport the wastewater from the service area to the reclamation facility. The proposed location is just west of SR 3 in the Belfair UGA (see Figure 9-1). This site is zoned Mixed-Use (MU). Due to the small pump station footprint and short construction duration (9 months), no significant land use impacts are expected. Construction would result in temporary land use impacts, generally consisting of dust,

noise, and construction traffic, as well as possible temporary restriction of access to properties located in construction areas. Refer to the Air (Section 4.2), Noise (Section 4.11), and Transportation (Section 4.14) sections of this Draft EIS for additional discussion.

No critical areas or shoreline areas would be affected.

Land Application. Construction required to install irrigation systems on the land application site is expected to be minor, entailing only small amounts of excavation and requiring only minor new aboveground facilities. Construction activities would be completed in approximately 6 months, and would not generate significant noise, air quality, or traffic impacts. Refer to the Air, Noise, and Transportation sections of this Draft EIS for additional discussion.

No critical areas or shoreline areas would be affected.

Service Areas. Construction of the local conveyance system in the Belfair UGA and LAMIRD and the pump stations in the Belfair UGA would result in temporary land use impacts consisting of dust, noise, and construction traffic, as well as possible temporary restriction of access to properties located in construction areas. Construction would occur in both commercial and residential areas in the Belfair UGA and predominantly residential areas in the LAMIRD. Although disruptive, construction activities in the service areas would not have a substantial long-term impact to these adjacent land uses. Construction impacts in the LAMIRD would initially be limited to the area designated as LAMIRD Zone A; and would potentially occur in the area designated LAMIRD Zone B, but only if future assessment of existing septic systems demonstrates sufficient failures to document an existing public health and adverse environmental impact warranting connection to the sewer system. Refer to the Air, Noise, and Transportation sections of this Draft EIS for additional discussion

To the greatest extent possible, collection lines will be constructed within existing roadway rights-of-way. Approximately five stream crossings may be required in the UGA collection area depending upon design of the system, and two crossings within the LAMIRD. Construction of the conveyance system along the North Shore of Hood Canal between the LAMIRD and the Belfair UGA would have the greatest likelihood of impacting wetlands. For crossings of wetlands and streams, the pipeline will be constructed using directional drilling, microtunneling, or other construction methods to reduce impacts. Mapped geologic hazards are also located in the service areas. Construction in these areas may require special studies and development of mitigation plans in accordance with County critical areas requirements. Refer to the Biological Resources and Earth sections of this Draft EIS for additional discussion.

Construction of the conveyance system in the LAMIRD and between the LAMIRD and the Belfair UGA pump station would largely be located within shoreline areas regulated under the County's Shoreline Master Program. A Shoreline Substantial Development Permit would be required.

Operational Impacts

Reclamation Facility. Due to the remote location of the proposed reclamation facility, ample room for facility setbacks from adjacent land uses would be provided. Surrounding land use is commercial forestry, though zoning would allow future rural residential development. Should

residential development occur on adjacent lands in the future, adjacent property owner concerns of long-term visual impacts of facilities, potential odors from the reclamation facility, and the potential effects of facilities on neighboring properties are possible.

The reclamation facility would be compatible with adjacent forestry use. However, if the reclamation facility creates odors and noise, potential impacts would be possible in areas designated for future residential development. The facility will be designed to be operated without spreading odor or noise to nearby areas, and the only substantial impact would be the visual appearance of the treatment and holding tanks. Although a series of treatment and holding tanks might be compatible with an area designated for rural residential development, from an aesthetic perspective, they could be out of place in a residential community. Because the reclamation facility will be operational prior to any residential development, impacts are not expected to be significant. The potential location is sufficiently large that the proposed facility could be buffered from neighboring properties with an undeveloped forested or landscaped area. Such a configuration could minimize the negative impacts associated with the appearance of the facility. Further, RR 5 (minimum 5 acres) zoning would limit the number of homes that could potentially be located in proximity to the facility property.

Pump Station. The pump station could affect neighboring properties because it could potentially generate odor and noise. Significant impacts are more likely to be perceptible in residential areas rather than in locations designated for commercial or light-industrial development. The magnitude of potential impacts will depend on the level of odor or noise created, but would be largest in the area immediately surrounding the proposed pump station. Because the facility will be designed to include odor and noise controls, impacts to surrounding properties are not expected to be significant.

Land Application. The potential land application area has been identified based upon existing land use, and would not result in alteration of that use. A long-term contract will be entered into with the property owner. No conversion or alteration of existing land uses would be required

The water used for land application will be highly treated and will not produce any odor or other noticeable effects. Generation of airborne contaminants and/or aerosols is a concern with any wastewater treatment process that involves using air to agitate the wastewater or where treated effluent is sprayed upon a land surface. Studies have indicated that potential aerosol related health risk associated with spray irrigation of treated effluent is very low, particularly when effluent is treated to Class A standards. Any impacts of aerosols from the Alternative 1 land application area are further reduced by the remote location of the application area. While the current zoning of surrounding areas (RR 5) would allow rural development on these lands in the future, the land application area would likely remain substantially set back from any nearby residential or other rural development. No long-term land use impacts from the land application of reclaimed water on forestlands are expected.

Service Areas. Land use impacts in the service areas are primarily related to development trends following the provision of sewer service. Currently, on-site septic requirements limit the amount of new development and redevelopment occurring in these areas. These impacts are discussed separately for the Belfair UGA and LAMIRD Zones A and B below.

Belfair UGA. It is likely that development plans in the Belfair UGA, which have been on hold due to the lack of sewer service, will be implemented quickly following the provision of sewer service. Housing density restrictions in rural areas (outside of the UGA) suggest upward pressure in demand for denser development that can only occur within designated UGAs. There is a considerable amount of vacant land within the Belfair UGA, which presents an opportunity for development of a substantial pool of housing stock in these areas. Based on information available from the County in 2001, there are 123 parcels covering 568 acres of vacant land. It is not currently known how much of that land is developable or redevelopable (ECONorthwest, 2003). The rate of development is heavily influenced by market forces, which may limit the expected growth. While market forces cannot be fully anticipated, it is expected that with the provision of sewer service the Belfair UGA will experience a substantially higher growth rate than in recent years.

Increased development and redevelopment will likely have a positive impact on the local economy. While development would occur in accordance with uses and densities allowed under Belfair UGA zoning designations, this development will likely contribute to a change in rural character as development densities approach those allowed by zoning and the area becomes more urbanized. The provision of sewer service may create pressure to extend the UGA or to allow development that is not consistent with the existing Mason County Comprehensive Plan.

Environmental impacts associated with development within the Belfair UGA have been evaluated as part of the County's Comprehensive Plan land use planning process (Mason County 2004). Individual proposed developments would be required to comply with all applicable federal, state, and local requirements.

LAMIRD Zones A and B. The County used the statutory criteria to identify the proposed LAMIRD (a Type 1 LAMIRD). The proposed LAMIRD boundaries, both for LAMIRD Zone A and LAMIRD Zone B have been carefully drawn to include existing small lot residential parcels and to exclude larger parcels that have potential to further subdivide under the RR 5 zoning. The exceptions to this parcel size limitation are a few parcels in public ownership (such as the state park) or parcels with environmental constraints that would preclude further development (i.e., wetlands or steep slopes). As such, even with the extension of sewer to this LAMIRD, development and redevelopment is only expected on existing vacant or undeveloped parcels. In some circumstances, that same existing parcel could potentially develop with an enhanced septic system design, even if urban sewer were not extended, subject to the lot size limitations under the County septic code. Therefore, extension of sewer to the LAMIRD Zone A is not expected to result in substantially greater new residential development compared to the existing condition. However, with the extension of sewer to this area, as land values increase under growth pressures, redevelopment of existing parcels with larger residential units or more year-round residents is likely.

This potential for increased development or redevelopment would expand into LAMIRD Zone B, but only if future assessment of existing septic systems demonstrates sufficient failures to document an existing public health and adverse environmental impact. Until those studies are completed, and an existing public health and environmental impact demonstrated, sewer service would be limited to LAMIRD Zone A.

Establishment of the LAMIRD would require an amendment to the Mason County Comprehensive Plan, including policy changes. The following elements would need to be revised:

- RU-100 would need to be modified to include the North Shore LAMIRD.
- RU-123 would need to be modified to exclude the North Shore LAMIRD.
- Chapter IV would need to be revised to reflect North Shore LAMIRD designation.

The purpose of the LAMIRD designation would be to allow very limited centralized wastewater treatment service for existing North Shore development that has likely contributed to the declaration of a severe public health hazard in Lynch Cove. All existing and buildable parcels would be connected to conveyance pipelines that would transport wastewater to the reclamation facility. This would require all existing properties to hook up to the sewer system, as well as all new development.

Inclusion of this area in the wastewater service area would likely result in pressure to increase density in the area served by the sewer system, reflecting the desirability of parcels with view and access to the shoreline. It is likely that many houses will be remodeled or upsized. The character of the area may start to change as home values increase and homes are remodeled or upsized. Parcels that are currently vacant may be developed. A Parcel Analysis of much of the LAMIRD area by MSA (2006) indicates that almost 80 percent of the parcels in the North Shore area are currently developed. There are approximately 56 vacant parcels remaining in LAMIRD A and approximately 214 vacant parcels remaining in LAMIRD B (Mason County, 2006). Following provision of sewer service, it is likely that many of these vacant parcels would be developed (at least those for which septic is the principle development constraint) and many of the underdeveloped parcels would redevelop with greater impervious surface areas.

Pressure may also increase from individual landowners just outside the LAMIRD to be included in the sewer service area. Increased development density and a trend toward urbanization in the North Shore area would not be consistent with a rural character. Policies and regulations will be needed that prohibit future expansion of the LAMIRD boundary and the extension of sewer service outside the LAMIRD.

Based on preliminary information, the cost to hook up to the sewer system is estimated to be approximately $18,000 to $20,000 for the LAMIRD Zone A and Belfair UGA residents (MSA, 2006). This cost could be prohibitively high for some residents, forcing them to sell their properties. While residents would incur these high initial costs associated with hooking up to the sewer system, property values would also be expected to increase. In addition to the costs of hooking up to the sewer system on private property, service area residents will be responsible for monthly sewer fees. The County will be pursuing a number of grant sources, low-interest loans, establishment of a Local Improvement District, and cost reductions to minimize the monthly sewer rates associated with the project.

Consistency with Adopted Regulations, Plans, and Policies

Overall, implementation of Alternative 1 appears to be consistent with adopted regulations, plans, and policies outlined above, which generally support the development of infrastructure to provide adequate public services. The reclamation facility would help Mason County achieve GMA and County Comprehensive Plan goals and policies related to the provision of sewer service to support urban levels of development in the Belfair UGA. The service to the LAMIRD would address water quality impacts of existing development while requiring new development to be consistent with the rural policies and densities of the Comprehensive Plan and Zoning ordinance.

Reclamation Facility. The reclamation facility would be located in unincorporated Mason County. Mason County has developed comprehensive plans to comply with the GMA. Policies in the Comprehensive Plan support development of the wastewater treatment facilities. The reclamation facility would be classified as an Essential Public Facility consistent with the GMA (MCC 17.06.010). Such facilities are processed as "special uses" in the RR 5 zone and would require early notification of the public, agencies, and affected jurisdictions. While a Special Use Permit would be required, no zoning changes would be necessary.

Conveyance Force Main. The conveyance route from the pump station site would extend east approximately 1.3 miles across the Belfair UGA and unincorporated Mason County through single-family residential (R-3), medium density residential (R-5), mixed-use (MU), and RR 5 zones. The pipeline would be constructed entirely within road rights-of-way, which would require a right-of-way permit from the County.

Construction of the conveyance line within the previously improved area of a public road right-of-way or authorized private road would be exempt from the County critical areas requirements (MCC 17.01.130(H)). Sections of the conveyance line that traverse sensitive areas may require a Mason Environmental Permit (MEP) as described earlier. Easements would be required to cross parks and private property.

Pump Station. The pump station would be located in an MU zone. Such facilities are processed as "special uses" in the MU zone and would require early notification of the public, agencies, and affected jurisdictions. While a Special Use Permit would be required, no zoning change would be necessary.

Land Application. The land application area would be located in an RR 5 zone and would be considered, with the proposed reclamation facility, as an Essential Public Facility and reviewed by the County through the Special Use Permit process described above.

Service Areas. As described above, the reclamation facility would help Mason County achieve GMA and County Comprehensive Plan goals and policies related to the provision of sewer service to support urban levels of development in the UGA. It will support existing intense development; improve water quality and maintain consistency with rural densities of the Plan and Zoning Ordinance in the LAMIRD.

The Mason County Comprehensive Plan (2005) is predicated on the development of a wastewater treatment facility, as planned growth in the UGA is dependent on the provision of

wastewater service. Therefore, the proposed water reclamation facility supports growth anticipated within the Belfair UGA as described in the County Comprehensive Plan.

The provision of sewer service to the LAMIRD is consistent with the GMA, which allows for the provision of public facilities and services to areas that have been developed prior to GMA adoption at densities too intense to be considered rural development. Mason County intends to provide this service in a manner that does not permit low-density sprawl through enforcement of proposed zoning designation in the LAMIRD (RR 2.5) and through development of a policy that prohibits future expansion of LAMIRD boundaries and future sewer extensions to the North Shore Area. The designation of the LAMIRD is a response to existing built conditions, and the boundary is being crafted to recognize and include the existing urban scale residential development contributing to water quality issues in Hood Canal. The LAMIRD is not an extension of the Belfair Urban Growth Boundary nor an establishment of a new urban growth area. Existing regulations would apply to this area.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Described below are the construction-related and operational impacts associated with the implementation of Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility. Additional site-specific environmental analyses as well as local permits would be required prior to the expansion of the reclamation facility, and construction of the conveyance and land application components.

Construction Impacts

Construction impacts are similar to those described above for Alternative 1, except that the construction footprint would be smaller for the reclamation facility and larger for the conveyance pipeline, force mains, and pump stations. Improvements to meet projected treatment flow requirements would be limited to expanding onsite facilities at the existing NB/CI reclamation facility. These improvements would be consistent with the existing land use and designations, and would not conflict with adjacent land uses.

While there would be a longer conveyance force main (6.3 miles), this force main would predominantly be constructed within the existing BPA transmission easement and railroad easement. Therefore, there would be fewer land use impacts associated with construction of the force main under Alternative 2. Transmission of the wastewater from the service area to the NB/CI facility would require two pump stations. One would be located on a small parcel near SR-3 in a Mixed-Use zone and the other near the railroad in an R-5 zone.

The existing land application area of 20 acres will be increased by 31 acres, for a total land application area of 51 acres. Construction required to expand the spray field irrigation area is expected to be minor, entailing only small amounts of excavation and requiring only minor new aboveground facilities. The land application area is located predominantly within an RR 20 zone; a small portion is located in an LTCF zone.

It is anticipated that construction of the facility expansion, conveyance force main, and pump stations would largely avoid impacting regulated critical areas. Where critical areas cannot be avoided, construction would adhere to prohibitions, mitigation requirements, and minimum

standards for development on properties that contain or adjoin County regulated critical areas. No shoreline areas would be affected by any of the components. Refer to Section 4.5, Biological Resources, for additional discussion.

Operational Impacts

Operational impacts are similar to those described above for Alternative 1. These improvements would be consistent with the existing land use and designations at the site, and would not conflict with adjacent land uses. Economic impacts to service area ratepayers would be generally similar to those described for Alternative 1. As described, a combination of grants, low-interest loans, and cost reductions will be pursued to minimize the monthly sewer fee.

As was described for Alternative 1, Alternative 2 is consistent with applicable land use plans and policies. This alternative would also provide sewer capacity to allow planned growth within the Belfair UGA and to serve the LAMIRD. The reclamation facility would be classified as an Essential Public Facility consistent with the GMA (MCC 17.06.010). Such facilities are processed as "special uses" in the RR 5 zone and would require early notification of the public, agencies, and affected jurisdictions. While a Special Use Permit would be required, no zoning changes would be necessary.

The conveyance route from the pump station site would extend southwest approximately 6.3 miles through the Belfair UGA and unincorporated Mason County through medium-density residential (R-5) and RR 5 zones. The pipeline would be constructed entirely within road rights-of-way, railroad right-of-way, and the BPA transmission easement. As described for Alternative 1, construction of the conveyance line within the previously improved area of a public road right-of-way would be exempt from the County critical areas requirements (MCC 17.01.130(H)). Sections of the conveyance line that traverse sensitive areas and/or shorelines may require a Mason Environmental Permit (MEP) and/or a Shoreline Substantial Development Permit as described earlier.

The pump stations would be located in a Mixed-Use and an R-5 zone. Such facilities are processed as "special uses" in these zoning designations and would require early notification of the public, agencies, and affected jurisdictions. While a Special Use Permit would be required, no zoning change would be required. The land application area would be considered, with the proposed reclamation facility, as an Essential Public Facility and reviewed by the County through the Special Use Permit process described above. Provision of reclaimed water to irrigation lands would not conflict with existing land uses, and no land use impacts would occur. In general, the planting and irrigation of trees would not conflict with adjacent land use, which is predominantly commercial forestry.

The impacts in the Belfair UGA and the LAMIRDs would be the same as described above for Alternative 1.

Alternative 3 – No Action

Mason County has designated Belfair as a County UGA. To accommodate the designated urban density (3-10 housing units per acre), Belfair will require sewer service. If sewer service is not provided, there may be significant impacts upon future development because on-site septic

systems could not support urban densities planned for Belfair. New development on vacant land within the UGA would be required to use on-site septic systems. Mason County development regulations require a minimum of 12,500 square feet for parcels served by on-site systems. Minimum lot size requirements for on-site systems are based on Department of Health On-Site Sewage Regulations, Chapter 246-272 WAC. This land requirement can increase as site conditions become less suitable for placement of drainfields or if the parcel is in close proximity to shellfish areas. Densities required in urban areas under GMA would not be achievable.

A review of Mason County Assessor maps revealed that about 75 percent of existing lots in the Lower Hood Canal shoreline areas (LAMIRD Zone A) are smaller than one-third acre, or approximately the same as Mason County's minimum requirement for a 12,500-square-foot lot size. Lots that are less than the minimum lot size do not have adequate land area for repairs or expansion of on-site system drainfields (Gray & Osborne, 2003).

For residential development along the shorelines of Mason County, the minimum building lot size is governed by the County's Shoreline Master Program. Residential and accessory unit requirements are based on minimum building lot size and multi-family development is based on maximum sewerage.

The currently developed portions of the North Shore area could face strict land development restrictions due to requirements for on-site wastewater treatment. These requirements would continue to restrict redevelopment and new development under the current zoning. Public health requirements could necessitate the County to potentially impose a moratorium on all new development.

Based on the MSA analysis, it is likely that many of the vacant parcels in the LAMIRD Zone A and LAMIRD Zone B areas could not be developed due to on-site septic requirement constraints. Because of the need to provide enhanced nitrogen removal for individual on-site systems, it is likely that some property owners would be unable to develop their properties. Existing lots may be too small for an enhanced system, or costs could seem prohibitive.

In the upland areas (outside of the shoreline jurisdiction), the costs to repair on-site septic systems (if repair is possible) are estimated to be between $10,000 to $37,000 per system, with wide variations depending upon site conditions and the value of the existing system. Additional on-site costs include normal operation and maintenance. Septic tanks should be pumped every three to four years, which can cost over $250. Smaller septic tanks would require more frequent pumping since they do not have the storage capacity required in newer tanks. For those property owners who cannot meet the current standards for repair, a non-confirming repair would likely be done with greater risk of failure over a shorter period of time, and potentially greater expense. Therefore, there is no guarantee that on-site repairs would resolve the water quality concerns.

Cumulative Impacts

Potentially, construction of the reclamation and conveyance facilities could coincide with County planned projects such as the SR 3 Belfair Bypass, resulting in cumulative construction-related land use impacts. The establishment of sewer service could allow the Mason County Comprehensive Plan to be more fully implemented, likely resulting in an increase in new construction and potentially changes in existing land use. As described above, Mason County will review numerous existing land use policies and modify as appropriate to ensure that

development does not extend beyond appropriately designated urban and rural activity center boundaries.

Mitigation Measures

Facilities and Land Application

No long-term adverse land use impacts are anticipated with the construction of a water reclamation facility, conveyance force main, or pump stations under Alternative 1 or 2, or the land application of reclaimed water. Compliance with development standards and associated permit conditions would mitigate the short-term and temporary construction impacts. Additional mitigation measures for construction disturbance are identified in the Air Quality, Noise, and Transportation sections.

The following measures would reduce impacts to land and shoreline use during force main construction:

- Maintain access to all residential areas and commercial/industrial businesses in the vicinity of pipeline construction to the extent feasible.
- Locate new pipelines in developed roadways or existing utility rights-of-way to the extent feasible.

For the pump stations, design approaches could be used that buffer the facilities from neighboring properties to reduce impact of odor and/or noise and minimize the appearance of facilities.

Compliance with all applicable reclaimed water and design standards would avoid any long-term impacts of land application.

Service Area

Developing a wastewater system for the Belfair UGA is necessary for implementation of the Belfair UGA Plan. Existing development regulations for rural lands, including RACs, shorelines, and critical areas would significantly reduce the potential for new development within the LAMIRD. Designation of the LAMIRD would result in an underlying zoning change from RR 5 to RR 2.5, however, because nearly all the parcels within the LAMIRD are already significantly smaller in size than 2.5 acres, minimal land use changes are anticipated.

There are a number of optional measures to consider as mitigation to limit potential impacts associated with designation of the North Shore LAMIRD and extension of sewer service. These options including potential revisions or modifications to comprehensive plan policies and development regulations. The options listed below represent a range of potential measures, which would be individually considered by Mason County prior to implementation.

Potential Comprehensive Plan Policies and Development Regulation Topics to address potential impacts from designation of the North Shore LAMIRD and extension of public sewer

- Amend Rural LAMIRD policies in the Comprehensive Plan to create a new "Residential Rural Activity Center" subcategory of RAC and to describe the North Shore Area as a Residential RAC. Residential RAC is an area that is characterized by a pattern of historic platted lots and residential development in the rural area on lots substantially smaller than the 5 and 10-acre lot sizes of the current rural land use designations. Boundaries of this Residential RAC must be defined predominantly by the built environment as it existed on July 1, 1990, consistent with the requirements of RCW 36.70A.070(5)(d)(i). Residential RACs would not be intended to encourage additional commercial or industrial development within the boundaries, but rather to recognize existing residential development, to permit residential development on existing substandard size vacant lots under limited circumstances, and to permit development of community septic system(s) or extension of urban sewer system to the Residential RAC, but only if demonstrated necessary to mitigate an existing public health and safety problem.
- Specify intent that North Shore is the only Residential RAC in County. Describe the two areas within this Residential RAC (LAMIRD Zone A and B) and the basis for distinguishing between the two areas within the Residential RAC.
- Include North Shore Residential RAC policies to guide creation of Development Regulations for North Shore LAMIRD that would:

  a. Prohibit expansion of Residential RAC boundaries; prohibit extension of sewer outside LAMIRD boundary, and only permit extension of sewer to Zone B after additional study and determination that existing septic systems are causing a public health and environment problem.

  b. Address existing environment and public health factors necessary to demonstrate whether sewer service is warranted or whether alternative septic systems are sufficient to protect public health and the environment. Distinguish Zone A and Zone B under these policies.

  c. Include policies to require increased maintenance or repair of existing septic systems with known failure, unless determination is made to extend sewer to that area.

  d. Consider implementation of a County-funded program to evaluate existing septic systems, especially in Zone B, to determine whether degree of failure warrants determination that either enhanced or community septic systems should be required or public sewer should be extended to Zone B.

  e. Identify circumstances where connection to sewer system is required (Zone A), and what, if any, temporary or interim improvements to septic systems can be permitted prior to construction of the sewer extension.

  f. Address circumstances under which new or expanded septic systems can be constructed (Zone B); and develop new requirements for septic system monitoring, maintenance and repair in conjunction with construction of new or expansion of existing development.

  g. Require decommissioning of existing septic systems in those areas where sewer hookup is required.

g. Consider requirement to aggregate existing adjacent substandard size lots in Zone B before construction of new septic systems.

h. Consider adoption of enhanced storm water low impact development standards for LAMIRD area.

i. Consider adoption of impervious surface limits beyond those currently contained in the RR 2.5 zoning within the LAMIRD area to address development and redevelopment on existing small lots.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse land use impacts are anticipated from the operation or construction of Alternative 1 or 2.

4.11 Noise

Affected Environment

This section describes existing noise sources and regulations within the project area. Potential impacts that could occur with the construction and operation of the proposed reclamation system, as well as potential mitigation measures, are discussed below.

Environmental Noise Sources

The human ear responds to a wide range of sound intensities. The decibel scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 decibels (dBA). For example, a 70 dBA sound level will sound twice as loud as a 60 dBA sound level. People generally cannot detect differences of 1 dBA; under ideal laboratory conditions, differences of 2 or 3 dBA can be detected. A 5 dBA change would be expected to be perceived under normal conditions. As a reference, sound levels from normal conversation range between 55 and 65 dBA. Noise levels above 110 dBA are not tolerable and can result in hearing loss.

Factors affecting the impact that a given noise will have on a person include the frequency and duration of the noise, the absorbency of the ground and surroundings, and the distance of the receptor from the noise source. Receptors are people adjacent to treatment or conveyance facilities who would detect noise from the project. Sensitive receptors include relatively high densities of population, and/or populations that could have a higher level of sensitivity, such as hospitals, schools, daycare centers, or retirement centers. The type of receptor and the usual background noise levels also determine the degree of impact.

Construction workers are typically the most directly impacted by high levels of construction noise. The Washington Industrial Safety and Health Act (WISHA) sets Permissible Exposure Levels (PEL) for construction workers exposed to noise. The PEL for construction workers is a noise level up to 85 dBA for an eight-hour average exposure. Workers exposed to average noise levels above PEL must use hearing protection and must be enrolled in a Hearing Conservation Program.

Existing Regulatory Environment

State Noise Regulations

State and local governments have primary responsibility for controlling noise sources and regulating outdoor noise levels in the environment. The Washington Administrative Code (WAC) 173-60-040 establishes noise limits that vary according to the land use of the property where the noise source is located and the property receiving the noise.

Noise limits are administered by the Washington State Department of Ecology (Ecology). State noise limits vary depending on the Environmental Designation for Noise Abatement (EDNA) of the noise source and the receiving property. The limits apply at the property line. Class “A” covers residential uses, Class “B” covers commercial uses, and Class “C” covers all other uses

on developed land. Table 4.11-1 shows Ecology's maximum permissible environmental noise levels based on the EDNA of a particular noise source.

Reclamation facility construction noise is exempt under WAC 173-60-050, Exemptions, where "sounds created by the installation or repair of essential utility service" are exempt during daytime hours from the maximum noise levels specified.

Table 4.11-1. Ecology's Maximum Permitted Noise Levels (dBA)

Land Use of Noise Source	Land Use of Receiving Property			
	Residential		Commercial	Industrial
	Day	Night[a]		
Residential	55	45	57	60
Commercial	57	47	60	65
Industrial	60	50	65	70

[a] Maximums are 10 dBA lower than daytime levels for residential receiving property from 10 p.m. to 7 a.m.
Source: WAC 173-60-040

Mason County Noise Regulations

Noise levels at the reclamation plant site and pump station locations would be additionally regulated by Mason County Municipal Code (MCMC) Chapter 9.36. The County's standards are the same as or less restrictive than Ecology's standards, as identified and discussed above. In general, construction noise is exempt from maximum permissible levels during daytime hours. According to MCMC Section 9.36.080, all "sounds created by the installation or repair of essential utility services" are exempt from noise restrictions during daytime hours (7 a.m. to 10 p.m., seven days a week).

Existing Sources of Noise

Community sound (also called environmental noise, residential noise, or domestic noise) is defined as sound emitted from all sources except sound at the industrial workplace (World Health Organization, 1999). Primary sources of community noise include road, rail, and air traffic; industries; construction and public work; and the neighborhood. The main indoor sources of noise are ventilation systems, office machines, home appliances, and neighbors. In residential areas, noise is generated from mechanical devices (e.g., heat pumps, ventilation systems, and traffic), as well as voices, music, sounds generated by neighbors (e.g., lawn mowers, vacuum cleaners, and other household equipment, music, and noisy parties), and domestic animals such as barking dogs (World Health Organization, 1999). In general, residential land uses do not create an excessive amount of noise. Commercial and industrial activities can sometimes produce a significant amount of noise.

There are several noise-sensitive uses located in the project area, including residences, schools, parks, and churches. Residential receptors are spread throughout the Belfair UGA, LAMIRD, and surrounding area.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Construction-related noise impacts under Alternative 1 generally would include generation of noise from construction equipment and vehicles. Construction activities would continue for approximately 18 months from the onset of project work, with the period varying in length and timing for each of the various project components, as discussed below. The magnitude of noise impacts would also depend on the proximity of construction activity to residences, businesses, schools, or other areas of human activity. Construction would occur during daytime hours only.

Reclamation Facility. Construction at the new reclamation facility near the Belfair UGA would occur for approximately 15 months. Construction-related noise impacts, however, would occur at higher levels during initial clearing, grading, and excavation activities. Because the area is dominated by utility right-of-way and commercial forest land uses, few people are present who would be affected by construction noise. Impacts would be temporary and are not expected to be significant.

Conveyance Force Main. Construction of the force main would occur over an estimated 9-month period. During this period temporary noise impacts would include generation of noise from construction equipment. Receptors along the proposed force main corridor include the businesses and residences surrounding portions of SR 300, SR 3, NE Old Belfair Highway, NE Clifton Lane, and several other Belfair UGA roads (Figure 3-1). Impacts would be temporary and are not expected to be significant.

Pump Stations. Construction of the pump station would occur over a 9-month period. During this period temporary noise impacts would include generation of noise from construction equipment. Receptors in the vicinity of the two proposed pump station location include the businesses and residences along SR 3. Impacts would be temporary and are not expected to be significant.

Land Application. Construction at the new land application site near the Belfair UGA would occur for approximately 6 months. Construction-related noise impacts, however, would occur at higher levels during initial clearing, grading, and excavation activities. Because the area is dominated by utility right-of-way and commercial forest land uses, few people are present who would be affected by construction noise. Impacts would be temporary and are expected to be minimal.

Service Areas. Construction of the local conveyance system in the Belfair UGA and LAMIRD would result in noise impacts, including noise generated by construction equipment and vehicles. Impacts would vary over time and space within the UGA, with impacts to individual residential and business receptors occurring only when local conveyance construction was active in the receptor area. All impacts would be temporary and are expected to be minimal.

Operational Impacts

The reclamation facility and the pump station would generate ongoing noise. However, the reclamation facility is removed from all highly sensitive receptors. The pump station would generate noise that may be received by residential and business receptors. Noises would include everyday operation of pump motors, as well as back-up generators operated during routine maintenance checks.

Additional operational noise would predominantly entail vehicle and equipment noise associated with the maintenance of facilities. The magnitude of noise impacts depends on the proximity of parks, high-density areas, schools, or other areas where large numbers of people congregate outdoors regularly. All operational impacts are expected to be minimal.

Consistency with Adopted Regulations, Plans, and Policies. Construction and operation of Alternative 1 would not result in significant sources of noise and would not change the general community noise conditions in the area. Construction activity would be exempt from noise regulations during daytime hours, and operational activity would be required to be in compliance with county noise regulations.

Service Areas. Described below are the noise-related operational impacts to the service areas.

Belfair UGA. Increased density and development would likely occur in the area served by the sewer system. A trend toward urbanization in the Belfair UGA would result in increased construction and vehicle noise levels. Of all of the project components, the greatest potential for noise perception would likely occur within the Belfair UGA, because this area has the highest density of existing and future development. The pump stations sited within the UGA will be designed to minimize noise potential and, where possible, would be located in areas away from adjacent residential or commercial development. Where required, appropriate noise control facilities would be installed.

LAMIRD. Because the LAMIRD is approximately 80 percent developed, additional development within the LAMIRD is limited. There are no anticipated ongoing noise impacts in the LAMIRD associated with the operation of the Alternative 1 system.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction noise impacts are expected to be similar to those described above for Alternative 1. Construction periods for all of the Alternative 2 elements are anticipated to be similar to those discussed in Alternative 1. For example, expansion of the existing NB/CI facility would occur over a 15-month period and expansion of the existing NB/CI land application area would occur over a 6-month period. Noise impacts from construction of Alternative 2, however, would differ as described below.

The alignment of the conveyance force main and the additional conveyance pump station would differ from Alternative 1. Alternative 2 would require approximately an additional 26,600 feet of force main and an additional pump station along the railroad right-of-way to facilitate

conveyance to the NB/CI facility (as depicted in Figure 3-3). Construction of the force main would remain within existing road, railroad, and utility rights-of-way, and the additional pump station would have the same footprint and pumping capacity. There are few sensitive receptors, however, along the proposed Alternative 2 conveyance and at the location of the second pump station.

Operational Impacts

Operational noise impacts are similar to those described above for Alternative 1, except for the areas in which noise production from the reclamation facility and associated vehicular traffic would occur. Similarly to Alternative 1, all noise creation at the NB/CI site would be minimized through proper facility design and maintenance. There would be no significant long-term operational impacts from the operation of Alternative 2.

The water reclamation facility and pump station would both require back-up generators to ensure ongoing wastewater collection and treatment in the case of power outage. Generators would be a source of noise both during power outage situations and during routine generator testing, typically completed on a monthly basis at reclamation facilities and pump stations.

Alternative 3 – No Action

Under the No Action Alternative, construction-related noise impacts would occur related to the replacement and installation of individual on-site septic systems. The reduced potential for additional development within the Belfair UGA with no sewer service would reduce the potential for increased community noise within the Belfair UGA as is anticipated under both action alternatives.

Cumulative Impacts

The establishment of sewer service could facilitate development as is anticipated for the Belfair UGA within the Mason County Comprehensive Plan, potentially resulting in an increase in new construction and additional short-term noise within the Belfair UGA. No significant cumulative impacts to noise are expected.

Mitigation Measures

During construction of the water reclamation facility, pump stations, and conveyance force main under either action alternative, best management practices (BMPs) would be implemented to minimize noise impacts. Construction-related BMPs would be used to reduce noise generation. Likely measures would include reducing vehicle and equipment idling, maintaining construction equipment in proper working condition, and ensuring properly installed mufflers. In addition, construction would occur during daytime hours only. These measures will be most important for construction activities in the Belfair UGA and the LAMIRD, where receptors are in close proximity.

For operation of either of the action alternatives, mitigation measures to control noise would be considered and developed for each component of the project. Typical noise reducing features for water reclamation facilities and pump stations include the encasement and/or shielding of noisy

equipment as appropriate. Locating the reclamation facility and pump stations away from sensitive receptors to the extent feasible will act as a primary way to reduce noise impacts.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse noise impacts are anticipated from the construction or operation of Alternatives 1 or 2, or from Alternative 3.

4.12 Parks and Recreation

Affected Environment

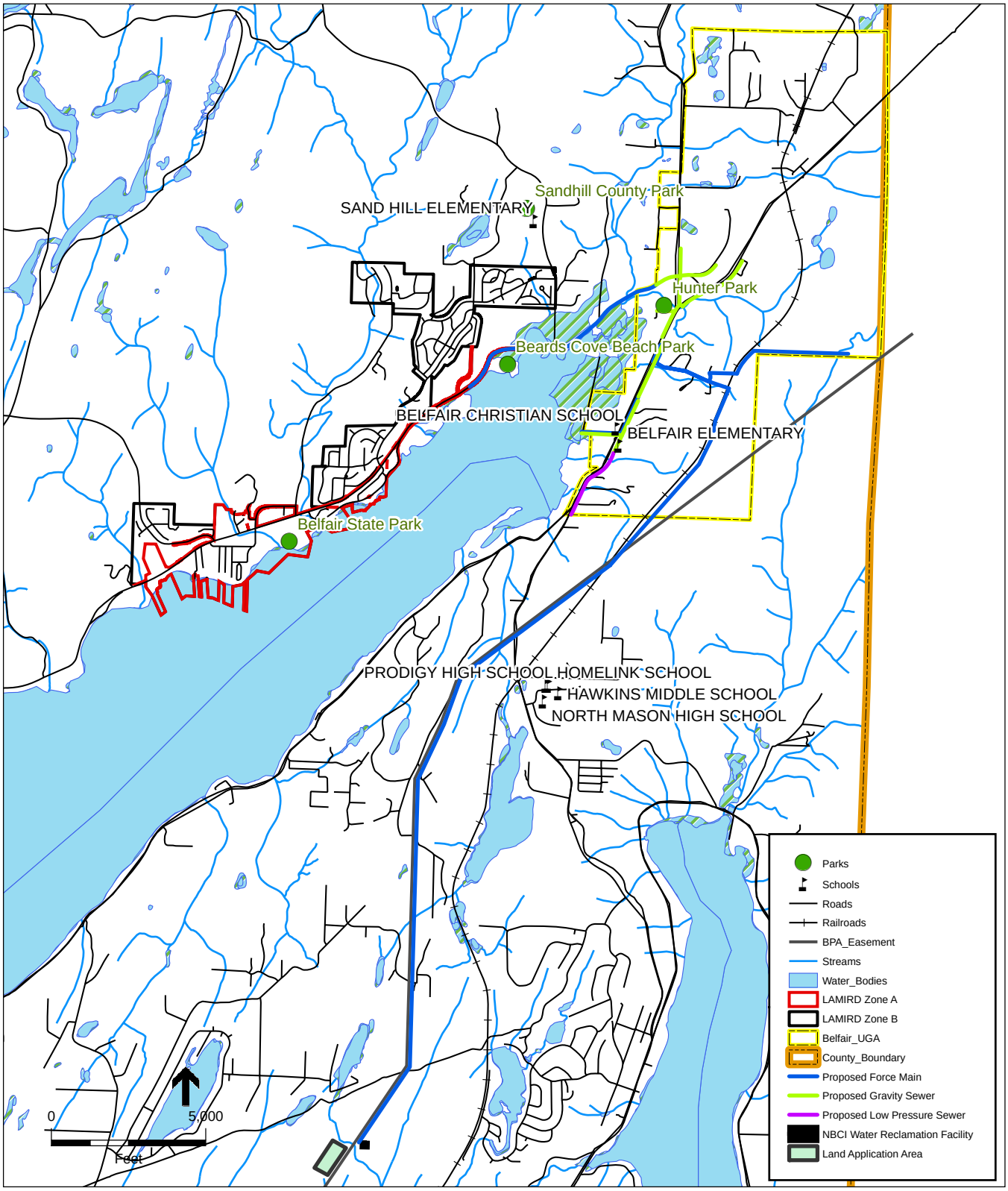
This section discusses the parks and recreation facilities in the Belfair area of Mason County that may affect, or be affected by, the proposed reclamation facility, conveyance pipeline, pump stations, and land application areas. Impacts and mitigation measures are discussed below.

Park Lands and Activities

Mason County residents have access to a number of local and state managed parks and recreation lands. The park systems include day-use and overnight camping facilities; fresh and salt water access for boating and other water sports; facilities and equipment for active sports and play activities; and wilderness areas and other open spaces for hiking, hunting, and horseback riding. The County currently manages 18 park properties, five of which are undeveloped or have large undeveloped areas. Within Mason County, Washington State Parks manages 15 parks totaling 1,874 acres in various stages of development.

The park and recreational facilities located in the project vicinity are shown in Figure 4.12-1. Major recreation facilities are described below.

- Belfair State Park is a 63-acre, year-round camping park with 3,720 feet of saltwater shoreline at the southern end of Lynch Cove. It is noted for its saltwater tide flats, wetlands with wind-blown beach grasses and areas for beach walking and saltwater swimming. Belfair State Park is a state recognized shellfish harvesting area, but has been closed to recreational harvest by the Washington State Department of Health. Beginning April 1, 2006, Belfair State Park was open to recreational harvesting on the western end of the park only (DOH, 2006a).
- Twanoh State Park is located on the south shore of Hood Canal, eight miles west of Belfair. It is a 182-acre marine camping park with 3,167 feet of saltwater shoreline on Hood Canal. Activities available at the park include 2.5 miles of hiking trails, salt water boating, moorage, fishing, swimming, and crabbing.
- Sandhill Park is a 30-acre county park and is located in northwest Belfair, near Sandhill Elementary School. Sandhill Park has seven ball fields, a concession and restroom building, and a park caretaker's residence.
- Beards Cove Beach Park, located just east of Belfair State Park, along State Route 300, is a small privately owned park with beach access.
- Hunter Park is a 0.15-acre county park within the Belfair UGA, near the head of Lynch Cove. The park includes a bus stop, benches, and a small amount of open space.
- Theler Wetlands is located at the west end of the Belfair UGA. The 135-acre wetland has an extensive trail system that offers opportunities for park users to experience the natural habitat of Hood Canal.
- Other recreational areas include numerous schoolyards and associated ball fields, two area golf courses, and privately and publicly owned forests used for hunting game.



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 4.12-1

Belfair/Lower Hood Canal Water Reclamation Facilities

Parks and Recreation

Plans and Policies

Mason County has developed a parks plan for its parks and recreation system. Goals and policies focus on providing an adequate system of parks, trails, recreational facilities and natural areas that are attractive, safe, functional, maintenance friendly, and accessible to all park visitors of Mason County (Mason County, 2006). The *Mason County Parks and Recreation Comprehensive Plan* establishes a standard Level of Service (LOS) for county parks. Mason County's current LOS for County parks and trails is 6.37 acres per 1,000 population (Mason County, 2006).

Impacts

Alternative 1 – Reclamation Facility near Belfair

Construction Impacts

This section provides an overview of potential impacts to parks and recreation facilities that could result during construction of either of the action alternatives.

Reclamation Facility. No significant impacts to parks and recreation facilities or activities are anticipated with construction of the reclamation facility, as there are no park facilities in the vicinity of the site. Noise and dust generated during construction would likely be noticeable to any individuals walking or hiking in the area.

Force Main. Construction of the force main would occur over a nine-month period in the rights-of-way of SR 300 and SR 3. Impacts could range from delaying traffic en route to parks, requiring detours, reducing roadside parking, and other inconveniences to park users. In cases where construction could occur within park boundaries, such as Belfair State Park, and Hunter Park, portions of these parks may be temporarily closed to users (Figure 4.12-1). Efforts will be made during design to avoid construction in active park areas.

Pump Station. Under Alternative 1 one pump station is currently proposed for construction. Construction-related impacts would be similar to those described for the force main. Access to Hunter Park could be temporarily obstructed during construction for short periods, but this is not anticipated to be significant because some access to the parks will continue to be available.

Land Application. No significant impacts to parks and recreation would be associated with construction of the land application site since the application site is approximately 0.75 mile from any park and recreation facility (Figure4.12-1).

Service Areas. Potential impacts within the Belfair UGA and LAMIRD are discussed below.

Belfair UGA. Construction of the local conveyance system in the Belfair UGA could result in temporary obstruction of access to area parks, including Hunter Park. In some cases construction could occur within park boundaries such as Hunter Park. Portions of the facility may be temporarily closed to users and/or parking may be reduced. Impacts would vary over time,

depending on the different stages of construction activity within the area. Areas of the park affected by construction would be restored following construction.

LAMIRD. Construction of the local conveyance system in LAMIRD Zone A could result in temporary obstruction of access to area parks including Belfair State Park, Beards Cove Beach Park, and Sandhill Park. Construction-related noise, dust, and traffic disruption could result in reduced usage of parks affected by construction. Impacts would vary over time within the LAMIRD, depending on the different stages of construction activity within the area. No significant impacts are expected since the majority of the parks will continue to be available for use.

Operational Impacts

Implementation of Alternative 1 is not likely to have any negative impacts on parks and recreation facilities or use. The reclamation facility is proposed to be located in a remote area used for commercial forestry, with no parks in the vicinity of the reclamation plant. There are also no parks or recreational facilities within approximately 0.75 mile of the land application site.

Implementation of Alternative 1 is anticipated to remove existing failing or poorly functioning septic systems, thereby improving water quality in Lynch Cove, particularly in the nearshore area. This improvement in water quality is anticipated to enhance the potential for recreational shellfishing and water contact recreation, particularly in the North Shore area, by eliminating bacterial and nutrient inputs from failing septic systems.

Providing centralized wastewater service to the area will indirectly result in an increased level of development. Refer to Section 4.10, Land and Shoreline Use, for additional discussion of forecasted growth. This growth, which has been planned for as part of the Mason County Comprehensive Plan, will likely result in an increased demand for recreational facilities.

Service Areas. Potential impacts within the Belfair UGA and LAMIRD are discussed below.

Belfair UGA. Increased density and development is planned for the area served by the proposed reclamation system under Alternative 1. The trend toward urbanization in the Belfair UGA would result in increased demand on existing park facilities in the general Belfair area. Existing park facilities may experience crowding and overuse as demand exceeds capacity.

LAMIRD. Impacts to parks and recreational facilities and uses are not anticipated with the operation of Alternative 1. As noted above, removal of pollutant inputs from failing or poorly functioning septic systems within the LAMIRD area is anticipated to result in improved water quality in Lynch Cove. Improved water quality will enhance recreational shellfishing, fishing, water contact sports, and the overall recreational experience in Hood Canal. Refer to the Fish and Shellfish sections for additional discussion of this issue.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction impacts to parks and recreation facilities are expected to be similar to those described for Alternative 1.

Service Areas. Construction of the local conveyance system in the Belfair UGA and LAMIRD is the same as described for Alternative 1.

Operational Impacts

Operational impacts to parks and recreation are similar to those described above for Alternative 1. There would be no significant long-term impacts on park and recreational facilities and services from the operation of Alternative 2.

Service Areas. Operation of the local conveyance system in the Belfair UGA and LAMIRD is the same as described for Alternative 1.

Alternative 3 – No Action

Under the No Action Alternative, no construction-related impacts to parks and recreation would occur because no new treatment facility would be constructed. Shellfishing and related activities which are currently limited due to low dissolved oxygen levels in Hood Canal would likely continue or be made worse under Alternative 3. This would have direct impacts on recreation opportunities.

Cumulative Impacts

Depending upon the availability of funding and other considerations, construction of the reclamation and conveyance facilities could potentially coincide with projects planned by WSDOT such as the Belfair Bypass project, or other local roadway projects. It will be important to carefully plan the timing of this project with any other construction projects to avoid extending the duration of roadway disruption, or requiring recently completed projects to be demolished soon after construction is complete. Mason County will coordinate closely with WSDOT and other potential project proponents in the area to avoid potential of prolonged or repetitive construction activities.

Alternative 1 would facilitate the implementation of the County's Comprehensive Plan, potentially resulting in an increase in new development with additional demand for park services within the Belfair UGA. The County will monitor the adequacy of park and open space facilities and services as the population in the area grows, and determine whether additional or expanded park facilities are needed to maintain the established LOS standard.

Mitigation Measures

Potential measures to reduce impacts to parks and recreation include the following:

- Coordinating with the parks departments to ensure that access is maintained during construction;

- Scheduling construction during non-peak recreational periods;
- Providing adequate notification prior to park closures or access restrictions;
- Placing adequate signage at and near the site to alert park users of upcoming use restrictions; and
- Restoring the park site to pre-construction conditions.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to recreation are anticipated from the construction or operation of Alternative 1 or 2. Recreational shellfishing conditions may worsen as a result of Alternative 3.

4.13 Cultural and Historical Resources

Affected Environment

This section addresses the affected environment related to cultural resources for the proposed Belfair water reclamation facility. Preparation of this section included a review of existing records and publications located at the Department of Archeology and Historic Preservation (DAHP), as well as consultation with the Skokomish and Squaxin Island Tribes. Impacts to the environment, mitigation measures, and significant unavoidable adverse impacts are also discussed below.

Existing Regulatory Environment

State Laws

The State of Washington protects cultural resources, including Indian graves and archaeological sites. State laws include Chapter 27.44 of the Revised Code of Washington (RCW), Indian Graves and Records, and Chapter 27.53 RCW, Archaeological Sites and Resources.

The State Environmental Policy Act (SEPA) (RCW Chapter 197-11) requires that state and local agencies evaluate and mitigate the impacts of their actions on cultural resources. SEPA requires that significant properties, including properties listed in or eligible for the Washington Heritage Register, must be given consideration when actions have the potential to affect them.

Local Regulations

Mason County has passed ordinances that govern management of archaeological sites and historic buildings and structures. The Mason County Municipal Code (MCMC Chapter 8.12) adopts by reference SEPA provisions as outlined above.

In addition, Chapter III, Section 10 (Historic Preservation) of the Mason County Comprehensive Plan identifies five policies to ensure preservation of historic and cultural resources. Policies are designed to ensure proper identification and protection of historical and cultural resources discovered during development activities or otherwise. Goal 5 of the section requires all development activity to be in compliance with the RCW 27.44 (Indian Graves and Records) and RCW 27.53 (Archeological Sites and Records).

Existing Archaeological and Historical Resources in Project Area

Cultural resources include recorded archaeological sites and areas with a high probability for archaeological resources. The project area is within the aboriginal territory of the Skokomish Tribe.

Native American Settlement and Historic Land Use in Project Area

The Belfair UGA and LAMIRD areas are within the territory of the Twana people, who are also known as the Skokomish. The Skokomish lived along the Hood Canal shoreline and along major rivers and were unified across tribal villages by a common language and culture. A small

village, consisting of one house approximately 30 by 60 feet in size and several other associated structures, was documented along the Union River approximately 1 mile above the mouth of the river. An additional Skokomish village was located near the mouth of Mission Creek. All Skokomish structures were of a cedar lodge construction style. The Skokomish primarily subsisted from salmon harvested in Hood Canal's tributary rivers, including the Union River and Mission Creek. Fishing techniques included the use of fish traps and dipping nets, at which point fish were prepared for immediate, fresh consumption and dried for winter consumption. Shellfish, including clams, crab, and oysters, were harvested from Hood Canal shorelines during summer months. Some hunting of terrestrial animals, as well as root, berry, and other plant resource collection, also occurred.

Adjoining the Skokomish people to the southeast were the Squaxin people, a group that predominantly inhabited the shorelines and rivers surrounding North Bay, Case Inlet, and other south Puget Sound shorelines. The Squaxin lived in similar cedar plank lodges to the Skokomish, and also similarly subsisted on a combination of salmon, land mammals, some birds, and vegetation. The Squaxin, however, used a different dialect and had differing cultural customs.

The Skokomish signed the Treaty of Point-No-Point in 1855 along with several other area peoples. The Squaxin signed the Medicine Creek Treaty in 1855. The United States was eager to clear title to the area lands for logging and settlement purposes. As a result the Skokomish and Squaxin left many historic villages to reside within the Skokomish Reservation, at the mouth of the Skokomish River to the southwest of the Belfair UGA, and the Squaxin Island Reservation within Case Inlet, respectively.

Review of proposed facility and conveyance force main construction locations for inventoried cultural/historic resources (cataloged by DAHP) indicates that several 'Pre Contact' resources and sites are in the vicinity of the project area. Inventoried resources include shell middens, hearths, beads, sites of burnt bones and charcoal, and sites of clam shell and mammal remains. Sites described as 'Pre Contact Camps' have been inventoried and mapped within the Belfair UGA. Sites described as 'Pre Contact Shell Middens' have been inventoried and mapped near the mouth of Mission Creek and in the Allyn area.

Euro-American Settlement and Historic Land Use in Project Area

In 1792 Captain George Vancouver and his exploration party were the first non-native individuals to arrive in the Hood Canal. Following this initial exploration, settlement in the area surrounding the head of the Canal did not occur until the 1850s, following the 1855 Treaties of Point-No-Point and Medicine Creek. The first settlers came to the area seeking to find fertile farmland, but quickly discovered that much of the area lacked ideal soil conditions. The Belfair area was used for limited agricultural activity at that time, with the earliest settlers arriving between 1859 and 1870. Successful agricultural activities in the area included the production of large hay crops and chicken eggs.

Timber harvesting of lowland stands of fir, cedar, and hemlock also increased throughout the Hood Canal basin following the signing of treaties and the establishment of nearby mills in 1854 and 1857. Horse and oxen teams were used to pull logs from small logging camps to the Hood Canal shoreline, from where they were transported to mills at Seabeck and Port Gamble. The

establishment of homesteads and logging camps occurred in similar fashion along the shorelines of North Bay and Case Inlet, with timber transported to Shelton and other south Puget Sound mills. The timber industry continued to grow and thrive in the Belfair and Allyn areas throughout the early 20th century, aided by more expansive rail networks and the invention of logging tractors.

Existing Historic Structures and Properties in Project Area

The project team examined DAHP records for properties and structures listed on the National Register of Historic Places (NRHP) and/or the Washington Heritage Register (WHR) (formerly State Register of Historic Places). This search revealed no registered sites located in or adjacent to the proposed Alternatives 1 and 2 sites. Within the project area vicinity, the Allyn Church is listed on the WHR and is located along SR 3 near the intersection with Eberhart Street.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

No construction-related impacts to cultural and historic resources under Alternative 1 are anticipated because there are no inventoried archeological or historical sites at proposed facility sites or conveyance corridors. During excavation activities, however, there is a possibility that archeological or historical artifacts could be encountered. Excavation is anticipated to be associated with the reclamation facility, pump station, and force main.

Considering the location of known archaeological sites, ethnographic place names, and the historic use of Hood Canal shorelines as well as Mission Creek, Union River, and Coulter Creek, excavation could disturb unrecorded archaeological deposits. This particularly true where excavation would occur below the depth of previous disturbance for development. Direct impacts to archaeological deposits would include changes to the condition or location of archaeological materials, such as removal or disturbance of archaeological materials during excavation, or changes in the condition of archaeological deposits due to compaction from placement of fill, construction spoils, roadways, or buildings. Impacts to archaeological resources have a higher likelihood of occurring at low-lying areas near Hood Canal and stream/river shorelines with a known history of Skokomish, Squaxin, and Post-Contact use. However, there is also some potential at the upland areas under consideration for the Alternative 1 reclamation facility and land application site to encounter unrecorded archaeological deposits.

Service Area. Construction of a local conveyance system could have potential impacts to unknown archaeological resources within the Belfair UGA and LAMIRD. Direct impacts to any encountered resources would be similar to those described above, but the potential is slightly less as excavation depths for the local collection sewers are relatively shallow.

Operational Impacts

It is not anticipated that cultural or historic resources would be affected by the operation and maintenance of the treatment facilities after pump station, force main, or land application area construction.

Consistency with Adopted Regulations, Plans, and Policies. Construction of Alternative 1 would be required to be in compliance with Washington State and County laws regarding cultural resources. Operation of the facility is not anticipated to have any effect on cultural or historic resources.

Service Area. Potential impacts within the Belfair UGA and LAMIRD are discussed below.

Belfair UGA. Increased density and development would likely occur in the area served by the sewer system within the UGA. The trend toward urbanization in the Belfair UGA would result in increased construction and increased potential for impacts to unknown archaeological or cultural resources.

LAMIRD. Because the LAMIRD is approximately 80 percent developed, additional development within the LAMIRD is limited. No cultural resource impacts in the LAMIRD associated with the operation of the Alternative 1 system are anticipated.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction-related impacts would be similar to those described for Alternative 1. However, the alignment of the conveyance force main and the additional conveyance pump station would differ from Alternative 1. Alternative 2 would require an additional 26,600 feet of force main and an additional pump station along the railroad right-of-way to facilitate wastewater conveyance to the NB/CI facility (as depicted in Figure 3-3). Construction of the force main would remain within existing road, railroad, and utility rights-of-way, which would minimize the potential to disturb archaeological resources. Previous development along the proposed conveyance corridor and at the location of the proposed second pump station (both along existing rights-of-way) would indicate that there is limited potential for disturbance of resources along these corridors. However, the potential exists for impacts to unknown resources within these areas.

Operational Impacts

It is not anticipated that cultural or historic resources would be affected by the operation and maintenance of the treatment facilities after construction.

Service Area. Service area impacts would be the same as those described for Alternative 1.

Alternative 3 – No Action

Under the No Action Alternative, no construction-related impacts to cultural resources would occur because no new reclamation facility would be constructed. Reduced potential for additional development within the Belfair UGA resulting from a lack of sewer service could potentially reduce the potential for impacts to unknown cultural and historic resources.

Cumulative Impacts

There are no cumulative impacts to cultural resources anticipated due to the construction and/or operation of the project.

Mitigation Measures

To minimize the potential for impacts to unrecorded cultural resources, a professional archaeologist could be retained prior to construction to conduct additional research and site-specific investigations in areas with high probability for archaeological resources. Should evidence of cultural resources be found, a professional archaeologist could develop a data recovery plan, with input from DAHP staff and the Skokomish and Squaxin Tribes regarding treatment of archaeological deposits. Additionally, a monitoring plan could be developed prior to construction that would include a review of construction techniques and establishment of monitoring procedures, techniques, protocols, and reporting requirements.

Should cultural resources of historic significance be found during construction, work would stop in the immediate vicinity and the appropriate agencies, including the DAHP, and representatives of the Skokomish and Squaxin Tribes would be contacted.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to cultural and historic resources are anticipated from the construction and operation of Alternative 1 or 2, or from Alternative 3.

4.14 Transportation

Affected Environment

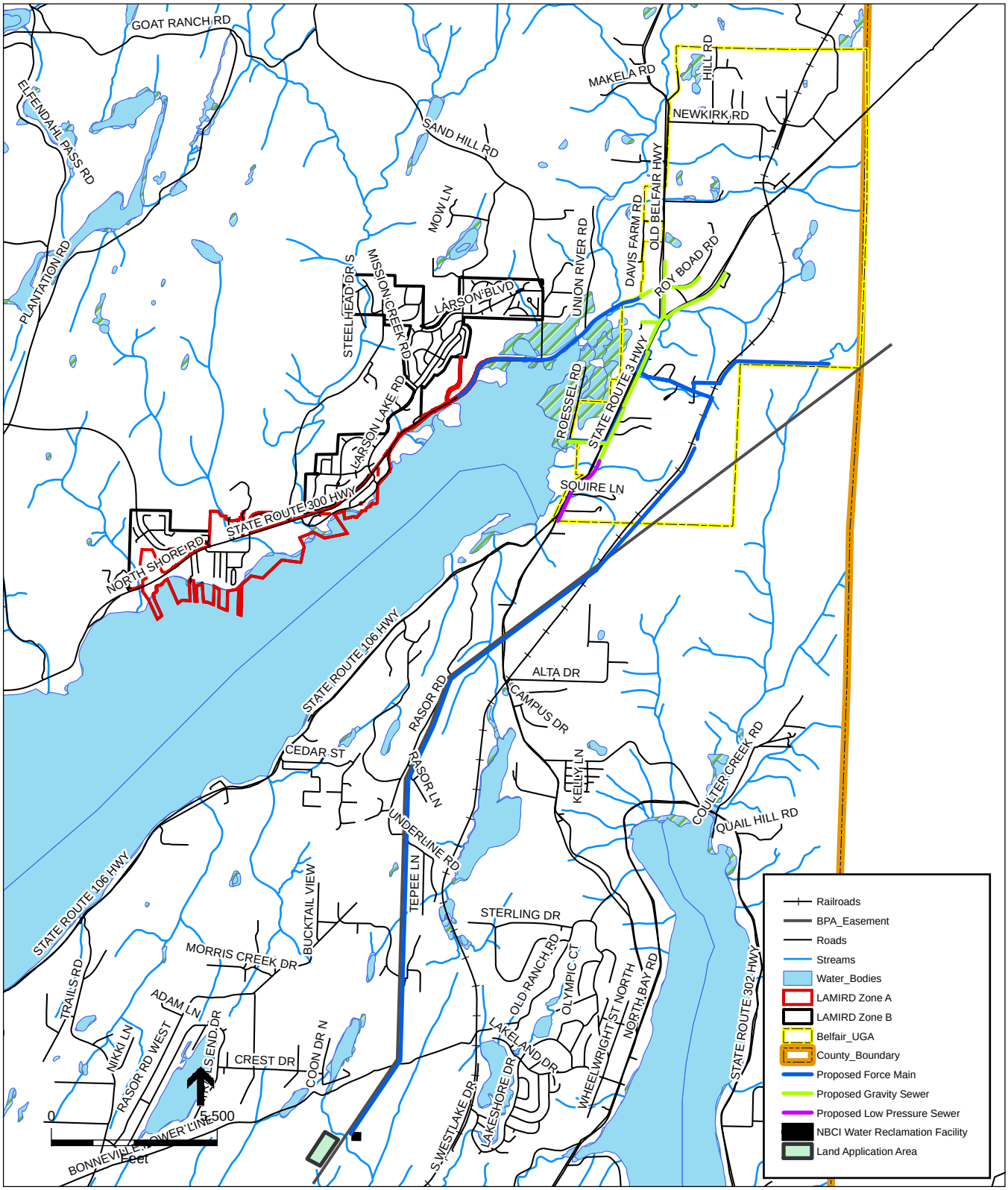
This section discusses the general transportation system in Belfair and Mason County that may affect, or be affected by, the proposed amendment to the Belfair Facilities Plan. Information and data reviewed in preparing this section were obtained from existing documents, including the Mason County Comprehensive Plan and Municipal Code. These information sources provided documentation of existing roadway characteristics, traffic volumes, transit service, non-motorized facilities, parking facilities, and planned improvements. This information was supplemented by limited site visits to the project study area.

Transportation Network

The street system in the vicinity of the project is shown in Figure 4.14-1. The area historically has had few traffic congestion problems, but congestion in the area has significantly increased in recent years. At this time, there are a number of traffic-related issues to be considered in the Belfair area, including the following:

- State Route 3 (SR 3) is the major highway entering Belfair from the northeast. Belfair's main street is SR 3 and the main commercial area is located at the intersections of SR 3, SR 300, and Old Belfair Highway. Large volumes of traffic passing through the city on SR 3 have also reduced traffic mobility and created a high accident corridor in Belfair. SR 3 continues southward toward Allyn and Shelton.
- State Route 300 (SR 300) intersects with SR 3 in Belfair and continues along the north shore of Lynch Cove toward Belfair State Park. The SR 3/SR 300 intersection forms the main junction for Belfair's urban center.
- State Route 106 (SR 106) intersects with SR 3 south of the Belfair UGA, near the head of Lynch Cove. SR 106 follows the Hood Canal west toward Union. This intersection is cause for traffic delays for travelers heading west on SR 106 or south on SR 3.
- Most Belfair area streets are without sidewalks, so pedestrian and bicycle safety has been a concern.

According to the County Comprehensive Plan, the Belfair area transportation needs are related to improving congestion and safety. Mason County and the Washington State Department of Transportation (WSDOT) have proposed a highway bypass around Belfair. The Belfair Bypass will relieve congestion around the chronically congested downtown Belfair area by providing an alternative route for through traffic. This should have a positive effect on Belfair's downtown commercial area, by providing easier access and circulation to businesses. WSDOT is currently preparing a NEPA Environmental Assessment (EA) on the proposed bypass project. The schedule and budget for design and construction will not be finalized until the NEPA process is complete. Construction is tentatively scheduled for 2010 (http://www.wsdot.wa.gov/Projects/SR3/BelfairBypass/).



SOURCE: MASON COUNTY, 2006/MURRAY SMITH ASSOC. 2006.

Figure 4.14-1

Belfair/Lower Hood Canal Water Reclamation Facilities

Transportation

Another project that would improve congestion and safety in the Belfair area is proposed for the intersection of SR 3 and SR 106. The project is currently in design phase. WSDOT is proposing to install a signal system at the intersection and provide left-turn lanes and right-turn pockets on both highways. The project is scheduled to be completed by Memorial Day 2007.

Traffic Volumes

Level of Service (LOS) describes the quality of traffic flow on a roadway or at an intersection. LOS is categorized between LOS A, acceptable flow with minimal delays, to LOS F, heavily congested roadways with traffic demand exceeding capacity. Unstable traffic begins to occur at LOS D. Based on traffic studies (Mason County, 2005) the County estimates that county roads outside of the Belfair UGA have a LOS of C and roadways within the Belfair UGA have an LOS of D.

Rail Transportation

There is no passenger rail transportation in Mason County. Rail services are used primarily by the lumber and wood products industry, and by the military. The Department of Defense operates and maintains the main rail line which parallels SR 3 from Shelton through Belfair. From Belfair, the line goes north to Bremerton and Bangor. The line south from Shelton runs in a southwesterly direction to McCleary and Elma in Grays Harbor County.

Adopted Transportation Plans

Mason County has developed plans and policies for its transportation system. Goals and policies focus on providing adequate mobility for people, goods, and service; maintaining and improving transportation facilities, while minimizing changes to the physical and social environment so as to preserve "rural character"; and supporting economic growth and development in coordination with the County's Comprehensive Plan (Mason County, 2005).

The Transportation Element of the Mason County Comprehensive Plan (Mason County, 2005) establishes standards and guidelines for the transportation system within the County. The adopted standard for county roads is LOS C.

Capital Improvement Plans

Mason County's Capital Facilities Plan (CFP) (Mason County, 2006) lists projects scheduled for construction between 2007 and 2012. According to the plan there are only two major projects identified in the project vicinity:

- North Shore Road Erosion Repairs are scheduled to take place in 2007. North Shore Road begins at SR 300 in Belfair and changes names at or near Belfair State Park. It parallels the shore of Hood Canal and continues to the Mason County line.
- Belfair-Tahuya Road is located 0.25 mile west of Belfair State Park and is scheduled for design and right-of-way acquisition starting in 2011. Currently no date for construction has been identified.

In addition, the plan calls for general maintenance of county roads including pothole repair, new gravel on select unimproved roads, safety maintence, and culvert replacement. These actions are scheduled to take place on an annual countywide basis (Mason County, 2006).

Impacts

Described below are the construction-related as well as operational impacts associated with transportation systems.

Alternative 1 – Reclamation Facility near Belfair

Construction Impacts

Reclamation Facility. Construction activities at the proposed water reclamation facility under this alternative would occur for approximately 15 months. There would be an increase in truck traffic along roadways around the proposed reclamation facility site, in particular along SR 3 and an existing private logging road that will be modified for access to the site. In addition to construction vehicles, such as heavy trucks and equipment, construction worker vehicles would also contribute to increased traffic. Construction traffic could result in localized slowdowns on area roads, particularly during peak traffic periods such as morning and afternoon rush hours. The majority of excavated material will be used on site as fill and dikes for the pond. Approximately 10,000 cubic yards of material are expected to be moved for construction of the reclamation facility. Average dump truck capacity is between 12 and 20 cubic yards, indicating that between 500 and 830 truck trips would take place over the entire construction period. Assuming approximately 300 working days during this period, this would represent an average of 2 to 3 truck trips per day would leave the site for earthwork. This level could vary, with a greater number of trips during peak periods of construction activity, and a lower number during other periods. Additional truck trips would be needed to deliver materials and equipment, so total truck trips would be expected to be higher during peak periods. This is not anticipated to be a significant impact, since the impacts would be temporary and peak construction periods would be short-term.

Force Main. All force main construction would occur within existing rights-of-way. Construction of the force main would occur over a 9-month period. During this period temporary transportation impacts would include traffic congestion, delays, and detours on force main routes. Construction techniques to avoid open cutting of roadways will be used when feasible, but some roadway construction is likely to occur. Approximately 4,000 cubic yards of material are expected to be moved for construction of the force main. Average dump truck capacity is between 12 and 20 cubic yards, indicating that between 200 and 330 truck trips would take place during construction. Motorists attempting to avoid affected roadways could create increased congestion on alternate surface streets located near the project area. However these impacts would be temporary and peak construction periods would be short-term.

Pump Station. Under Alternative 1, one pump station is currently proposed for force main conveyance to the reclamation facility. Construction impacts to transportation would be limited to SR 3 and Roessel Road. Construction of the pump station is anticipated to last up to 9 months. Construction phasing would be planned so that the pump station would be installed during conveyance line construction. Truck trips for the pump station construction are included in those estimated for the force main.

Land Application. The land application site is located adjacent to the reclamation facility site. Construction associated with the land application site is minimal; traffic impacts would not be discernible from those associated with the reclamation facility.

Service Areas. Described below are the construction-related transportation impacts associated with the service areas.

Belfair UGA. Construction of the conveyance system in the Belfair UGA would result in congestion, temporary obstruction of roadways, and/or lane closures and detours. Roads directly impacted include SR 3, SR 300, and Old Belfair Way, as well as local streets and roadways. Impacts would vary over time within the UGA, depending on the intensity of construction activity within the area. Approximately 19,000 cubic yards of material are expected to be moved for construction of the UGA conveyance. Average dump truck capacity is between 12 and 20 cubic yards, indicating that between 950 and 1,600 truck trips would take place during the approximately 9-month construction period, averaging approximately 5 to 8 truck trips per day. All impacts would be temporary and no significant impacts are expected, although local residents will experience periodic inconvenience and delays. Table 4.14-1 summarizes the roadways potentially affected by construction within the roadway right-of-way.

Table 4.14-1. Roadways Potentially Affected by Construction

Impacted Transportation Component	Description of Activities
State Route 300	Construction of forcemain and gravity sewer lines in the SR 300 ROW.
State Route 3	Gravity sewer and forcemain lines to be constructed in ROW along SR 3.
Old Belfair Way	Construction of gravity sewer line along Old Belfair Way ROW.
Roy Road	Construction of gravity sewer line along portions of Roy Road ROW
Roessel Road	Gravity sewer and forcemain lines to be constructed in ROW along Roessel Road.
Romance Hill Road	Construction of forcemain on along Romance Hill.
Railroad ROW	Construction of forcemain in the Department of Defense ROW.

LAMIRD. Because the roadways within LAMIRD Zone A and Zone B are generally two-lane roadways, construction could result in temporary congestion, potential road closures, and detours. Roads directly impacted include SR 300 and Sandhill Road. Construction of the conveyance system in LAMIRD Zone A would occur concurrently with the proposed construction of the reclamation facility. Approximately 17,000 cubic yards of material are expected to be moved for construction of the LAMIRD forcemain. Average dump truck capacity is between 12 and 20 cubic yards, indicating that between 850 and 1,400 truck trips would take place during construction. Assuming an approximately 9-month construction period, this would result in an average increase from 4 to 7 trucks per day. Assuming that peak periods of

construction could generate higher numbers of truck trips, local roadways could experience periodic but substantial congestion.

Operational Impacts

Following completion of the reclamation facility, traffic increases would be minimal. Reclamation plant staff and delivery of equipment and supplies will add a small number of trips to the reclamation facility each day; however, these additional trips are not likely to be noticeable on local roadways.

An indirect impact of implementing the proposed amendment is the potential increase in development. As the area grows, additional traffic on area roads will continue to contribute to congestion. Proposed roadway improvements will help to reduce delays and congestion, but even with planned improvements some congestion will likely continue. Mason County has incorporated potential population increases into its transportation planning, and will continue to assess the regional roadway network as this growth materializes.

Consistency with Adopted Regulations, Plans, and Policies. The Mason County Comprehensive Plan - Transportation Element (Mason County, 2005) has anticipated and planned for the development that would occur in the Belfair UGA following the extension of wastewater services. The transportation infrastructure in the Belfair UGA would be expanded to meet future needs.

Service Areas. Described below are the operational transportation impacts associated with the service areas.

Belfair UGA. Increased density and development would likely occur in the area once wastewater services are introduced. Mason County has planned for this increase in population and density in the UGA through their comprehensive planning process. Traffic estimates developed as part of the Mason County Comprehensive Plan incorporated the population growth that would occur following implementation of the wastewater system. Even with anticipated improvements to the local transportation network, it is likely that local traffic conditions will become increasingly congested.

LAMIRD. LAMIRD Zones A and B are estimated to be approximately 80 percent built out at this time, so new development will likely be limited. For some area roadways such as SR 300, even modest increases in traffic volumes could result in localized delays and increased congestion. Mason County transportation planners will monitor traffic volumes on these roadways as development occurs, and will work to address problems before they become significant.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Impacts to transportation under this alternative are similar to those described above for Alternative 1, but more extensive due to the longer alignment of the conveyance force main. Because of the more southerly location of the reclamation facility site, the conveyance force

main would be more than 5 miles longer than Alternative 1 and two pump stations would be required instead of one (Figure 3-3). Pump Station 1 will be located in the same location as in Alternative 1, and Pump Station 2 will be located along the railroad right-of-way under this alternative. The force main alignment would include a crossing along SR 3 and numerous crossings of neighborhood streets. Extending the force main to the NB/CI facility would require an additional 12,000 cubic yards of earth to be moved, requiring an additional 600 to 1,000 truck trips over the 15-month construction period

Service Areas. Construction of the local conveyance system within the Belfair UGA and the LAMIRD would have similar impacts as those described for Alternative 1.

Operational Impacts

Operational impacts to the area's transportation network are similar to those described above for Alternative 1. There would be no significant long-term impacts from the operation of Alternative 2.

Service Areas. Operation of the local conveyance system in the Belfair UGA and the LAMIRD would have the same impacts as those described for Alternative 1.

Alternative 3 – No Action

Under the No Action Alternative, no construction-related impacts to the transportation network would occur because no new wastewater treatment facility would be constructed.

If wastewater service is not provided in the Belfair UGA, growth in the UGA would be limited to levels allowable using on-site septic systems. Congestion on area roadways will likely continue, but with a reduced revenue base to maintain and improve the transportation network, there may be more limited options for locally-funded roadway improvements.

Cumulative Impacts

Although the timing for the proposed forcemain construction is scheduled sooner, there is the potential for construction of the reclamation and conveyance facilities to coincide with County and WSDOT planned projects such as the Belfair Bypass, North Shore Road Erosion Repairs, and the Belfair-Tahuya Road repairs. It will be important that the County coordinate closely with WSDOT and County transportation planners, to combine construction efforts where appropriate and to avoid repeated or extended disruption of roadways. If projects are not concurrently planned, roadway disruption in the area could extend continuously over the next several years.

The establishment of wastewater service would allow the Mason County Comprehensive Plan to be more fully implemented, likely resulting in an increase in new construction and additional short-term impacts to transportation within the Belfair UGA, as well as long-term increases in traffic volumes. The resulting traffic conditions in the area will likely reflect a more urbanized area as population continues to increase. Because the roadway network may be more appropriately designed for a rural area, there may be continuing congestion and local delays.

Cumulative impacts of Alternative 2 would be similar to those for Alternative 1, but more extensive transportation impacts could be expected during construction due to the length of force main conveyance alignment in the roadway.

Mitigation Measures

Described below are measures designed to minimize transportation-related impacts.

- Additional site-specific studies will be done during facility design to determine appropriate measures to avoid significant impacts to local roadways during construction.
- Horizontal directional drilling, microtunneling, or other trenchless technologies will be used to avoid disruption of high-traffic roadways such as selected sections of SR 3.
- Construction activities would be conducted during weekdays between hours permitted by Mason County.
- A traffic control plan would be implemented during construction to ensure continued vehicular access on local streets.
- Flaggers would control and coordinate traffic flow.
- Signs would be posted to alert drivers to the presence of construction activities.
- Traffic cones or barrels would be placed to direct traffic away from construction areas and into appropriate travel lanes.
- Conveyance construction would be coordinated with WSDOT to ensure that traffic impacts are reduced to the extent possible.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to transportation are anticipated from the construction or operation of Alternative 1 or 2. Short-term inconveniences and delays would likely occur during construction, but these will be mitigated to the greatest extent possible. No significant unavoidable adverse transportation impacts are anticipated associated with Alternative 3.

4.15 Public Services and Utilities

Affected Environment

This section addresses existing public services and utilities in the project area. "Public services" refers to fire and emergency response services, police, schools, and solid waste. "Utilities" refers to water, wastewater, electricity, natural gas, and telecommunications.

Solid Waste

Mason County's Solid Waste Utility provides transfer and disposal operations for solid waste and household recyclable materials. In the Belfair area, solid waste and recyclables are dropped off at a transfer station location within Belfair. Materials collected in Belfair are transported to a rail facility outside Shelton. From there, the material is long-hauled via railroad to Roosevelt Landfill in Klickitat County, located in eastern Washington.

Water

Belfair Water District No. 1 is the largest public water system in the north county area and the third largest water purveyor in the County. The service area is concentrated primarily along SR 3 and encompasses the Belfair UGA and the South Shore urban area. The area within the District boundaries is approximately 1,700 acres.

The District has two wells in service that are located on Mason County Public Utilities District (PUD) No. 3 property. These wells have been in use since the mid-1960s. All wells are artesian. The quality of water from the wells is considered excellent (Gray & Osborne, 2003).

According to the Washington State Department of Health's Water System Inventory there are approximately 51 water system purveyors in the Lower Hood Canal between Belfair, Union and Tahuya. Of these, six systems depend on springs for domestic water use while the rest depend on groundwater supplies. All residual uses outside the service areas of the PUD No. 3 or the Belfair Water District are served by private water systems or individual wells (Gray & Osborne, 2003). Within the LAMIRD, water service is provided by a combination of individual wells as well as a community water system.

Wastewater

Most of Mason County, including the Belfair/ Lower Hood Canal area, is currently served by on-site sewer systems. The County owns and operates small water and sewer systems for the Harstene Pointe and Rustlewood communities, and the North Bay/Case Inlet (NB/CI) facility near Allyn. The NB/CI system provides service to approximately 950 customers, with the potential to serve an estimated 850 additional residential units within the existing service area. As of 1996 there were approximately 16,000 on-site sewage systems in unincorporated Mason County (Gray & Osborne, 2003). Many on-site systems were installed over 20 years ago and would not meet current state and county design and siting criteria (Gray & Osborne, 2003). On-site systems include conventional septic tanks with drainfields and alternative systems such as mound and sand filter systems (Gray & Osborne, 2003).

Wastewater planning in Mason County is described in the Mason County Comprehensive Plan. Wastewater facilities planning is done through amendment to the Comprehensive Plan. The Capital Facilities Element of this document includes a description of planned improvements necessary to meet state regulatory guidelines in the provision of water and wastewater services for these systems.

The 2005 Update of the Comprehensive Plan identifies the Belfair UGA as one of the areas "which have been identified as problems with regard to density and water quality, but where no established systems are currently in place." The Comprehensive Plan noted that the County was evaluating the feasibility of providing wastewater collection and treatment in the Belfair UGA and the Hood Canal North Shore area. The project was expected to be completed by approximately 2009. In addition to the Belfair UGA, the Comprehensive Plan identified the Hoodsport Rural Activity Center as needing a long-term resolution to the problem of wastewater management.

A draft Facilities Plan for the Belfair/Lower Hood Canal study area was prepared in 1997, and from December 1997 through June 1999 it was considered by the Belfair/Hood Canal Sewer Facilities Advisory Committee. The process continued until mid 2001, when a final Facilities Plan was submitted to the Washington State Department of Ecology (Ecology). That plan was approved by Ecology in 2002, but Mason County decided additional analysis was needed. An amended Facilities Plan was prepared in 2003. The current wastewater Facilities Plan supplements information included in the 2003 Facilities Plan.

The Washington Department of Community Trade and Economic Development is currently providing funding to construct a sewer facility for Belfair. The 2005 legislature appropriated $16 million for Mason County to construct a sewer system in Belfair. The 2006 legislature reduced the amount by $4.8 million to fund other priority projects in the canal.

From 1994 through 1996, Mason County surveyed 4,548 on-site systems in the Belfair/Lower Hood Canal area, of which 485 were identified as failing. As of January 22, 1997, repairs had been provided to 342 of the failing systems. Approximately 20 percent of the failed systems were found in the shoreline area with about 8 percent in the upland areas. It should be noted that property owners denied the County access to 703 properties with on-site systems or about 15 percent of the total (Gray & Osborne, 2003).

There are several large on-site systems in the Belfair/Lower Hood Canal area that range in size from 3,500 to 14,000 gallons per day (gpd). Commercial septic systems and community drainfields are permitted and monitored by the Washington State Department of Health.

Stormwater

Existing stormwater facilities in Mason County include local drainage systems that collect and convey surface water runoff to open channels, roadside ditches, and pipes. The County currently has no stormwater plan or utility. Stormwater is managed primarily through on-site control measures.

Mason County adopted a Stormwater Management Ordinance in 1997. This ordinance adopts by reference the latest edition of Ecology's Stormwater Management Manual, with the exception of

the Minimum Requirements chapter, for use in designing best management practices (BMPs) for new development and other improvements. The ordinance defines specific minimum requirements and other approval standards for development on all parcel sizes (Mason County, 2005).

Mason County is currently updating its Stormwater Policies and Regulations, and has recently hired a consultant to assist in developing a Stormwater Management Program. The program will include recommendations tailored to areas of specific concern, including both rural and urban areas, Hood Canal, shellfish growing areas, etc. Final consultant recommendations of the Stormwater Program are due in December 2006. Ecology has provided additional funding to develop specific stormwater management plans for Belfair and Hoodsport.

Electricity

Mason County PUD No. 3 provides electrical power to residents in the Belfair UGA, the LAMRID, and surrounding area. PUD No. 3 purchases power from the Bonneville Power Administration (BPA) and distributes it to customers. Power lines of 230,000 volts serve the Belfair UGA and surrounding area. The BPA right-of-way is located along the southern edge of the UGA. High-voltage lines to a neighborhood distribution substation located at SR 300 and NE Union River Road carry the electrical power.

Gas and Propane

Cascade Natural Gas Corporation provides natural gas throughout Mason County. Cascade Natural Gas serves approximately 1,450 commercial and residential customers in Mason County. Storage facilities are located outside of Mason County at sites near the cities of Chehalis and Plymouth, which serve all of the system in Washington. A major supply line for the company runs through Mason County in both the Shelton and the Belfair UGA. No specific system expansions are planned in Mason County at this time, but the company has a policy of expanding its supply system to serve additional customers.

Telecommunications and Cable

Several companies provide local telephone service in Mason County. They include Hood Canal Telephone Company, Inland Telephone Company, and Qwest Communications. Belfair and the surrounding area are served by Qwest Communications. Wave Broadband provides cable service in the project area.

Fire and Emergency Response

Mason County Fire District #2 provides fire protection service to north Mason County including Belfair and the surrounding area. Mason County Fire District #2 is located at 460 NE Old Belfair Highway and is responsible for fire protection within the project area. The district is an all-volunteer unit, made up of 17 volunteer firefighters and paramedics. There are also a total of 40 volunteer Citizen Response Team (CRT) members, who respond to emergencies in remote areas of the district. The district has a total of eight stations, numbers 21-28, each with varying capabilities and equipment. The districts operate 24 hours a day, seven days per week (http://206.53.161.129).

Police

The Mason County Sheriff's Office provides police services to residents of unincorporated Mason County, which includes the greater Belfair area. The Mason County District Court, located in Shelton, handles all County-jurisdiction cases. Mason County has a juvenile detention or lockdown facility. The County currently has a severe shortage of jail space for adults, resulting in the early release of some offenders.

Schools

North Mason County School District #403 serves the greater Belfair region with five schools. Belfair Elementary is located on SR 3 within the Belfair UGA and provides services for K-6 grades. Belfair Elementary has over 700 students and teachers. Sandhill Elementary also provides for grades K-6, and is located on Sandhill Road northwest of the Belfair UGA by Sandhill Park. Hawkins Middle School serves students in 7th and 8th grades, and is located on Campus Drive in Belfair. North Mason High and Pace Academy serve Belfair area grades 9-12.

Impacts

Alternative 1 – Reclamation Facility near Belfair

Described below are the construction-related and operational impacts associated with the implementation of Alternative 1 – Reclamation Facility near Belfair.

Construction Impacts

Reclamation Facility. Construction at the new reclamation facility near the Belfair UGA would occur for approximately 15 months. Construction-related impacts under Alternative 1 could result in potential temporary disruption of water, electricity, and gas service and increased response time for police and fire emergencies due to increased traffic along roadways around the proposed reclamation facility site. These impacts would not substantially affect public services and utilities.

Force Main. All force main construction would likely occur within existing rights-of-way. Construction of the force main and transmission lines would occur over a 9-month period. During this period temporary public services and utilities impacts could include potential disruption to utility services and delay in response of emergency vehicles due to traffic congestion caused by construction. Site-specific evaluations will be conducted during facility design to identify the location of existing utilities and avoid conflicts whenever possible. Because the proposed conveyance corridor includes a number of existing utilities, avoiding conflicts may not always be possible. Construction techniques such as microtunneling or horizontal directional drilling may be used in selected areas to avoid utility conflicts or sensitive resources such as wetlands or streams.

Pump Station. Under Alternative 1, one pump station is currently proposed associated with the force main. Construction impacts to utilities and public services could include potential disruption to utility services and delay in response of emergency vehicles due to traffic congestion caused by construction. Construction phasing would be planned so that pump

stations are installed during conveyance line construction. As noted above, site-specific utility surveys will be conducted to help avoid utility conflicts.

Land Application. No significant impacts to utilities and public services will be associated with construction of the land application site due to the remote location of the application area (Figure 3-1).

Service Areas. Construction of the local conveyance system and pump stations in the Belfair UGA and LAMIRD may result in temporary disruption of utilities and delay in response of emergency services. Impacts would vary over time within the UGA and LAMIRD Zone A, depending the different stages of construction activity within the area. All impacts would be temporary and no significant impacts are expected.

Operational Impacts

Consistency with Adopted Regulations, Plans, and Policies. The proposed project would be consistent with the Future System Development identified in the Mason County Comprehensive Plan, Capital Facilities Plan for Water and Wastewater Utilities. This plan identifies the need to provide wastewater collection and treatment for the Belfair UGA and the North Shore area.

The proposed project will incorporate all relevant aspects of the existing Stormwater Management Ordinance. As the future Stormwater Management Program is developed, the Belfair UGA and LAMIRD would be subject to the new requirements.

Service Areas. Potential impacts within the Belfair UGA and LAMIRD are discussed below.

Belfair UGA. Increased density and development would likely occur in the area served by the sewer system. A trend toward urbanization in the Belfair UGA would result in increased demand on existing utilities and public services.

Provision of wastewater service would result in the need for existing on-site septic systems to be decommissioned. This will result in additional costs for area residents currently served by septic systems. Cost of wastewater service will increase significantly for local residences and businesses as a result of implementing the wastewater collection and treatment system. Mason County is currently evaluating the financial impacts of implementing the Facilities Plan. As described in Section 1.7, the cost per household for sewer service has not yet been determined, but initial rate estimates could exceed $200 per month if additional funding is not secured. Financial assistance will be available, including low-interest loans and other sources. However, the increased costs may be a financial hardship for many current residents, particularly elderly and low-income residents. Mason County is seeking funding in a number of areas in an effort to reduce overall project costs.

LAMIRD. As described above, existing septic tanks within the LAMIRD will need to be decommissioned after wastewater service is available, and there will be potentially significant costs to existing residents to connect to the sewer. Residents located in LAMIRD Zone B will

not realize these costs in the near future, but would financially participate if and when their area is connected to the centralized wastewater system.

Alternative 2 – Expansion of the North Bay/Case Inlet Reclamation Facility

Construction Impacts

Construction impacts to utilities and public services are similar to those described above for Alternative 1. Construction periods for all of Alternative 2 elements are anticipated to be similar to those discussed in Alternative 1. The alignment of the conveyance force main and two pump stations would be different from Alternative 1, and are anticipated to be located as depicted in Figure 3-3. In Alternative 2, the conveyance force main would be extended along the BPA transmission line south to the NB/CI facility, thus avoiding potential utility conflicts in existing roadway corridors.

Operational Impacts

Operational impacts to utilities and public services are similar to those described above for Alternative 1. There would be no significant long-term operational impacts from the operation of Alternative 2.

Alternative 3 – No Action

Under the No Action Alternative, no construction-related impacts to utilities and public services would occur because no new centralized treatment system would be constructed. On-site treatment systems would continue to be used for wastewater disposal, potentially increasing rates of failure or improper treatment efficiency. Many failing or malfunctioning systems would need to be replaced or substantially upgraded; costs for some of these systems could range from approximately $10,000 to as much as $37,000 per system, according to current estimates made as part of the amended facilities plan. These costs would vary widely depending upon the site-specific conditions and the value/condition of the existing system, but costs are expected to be significant. Additional measures would likely be needed by the County to maximize efficiency of the existing on-site systems. Such measures could include development of a management entity or other organizational structure to manage the range of issues associated with septic systems. This type of entity does not currently exist in Mason County, and would have to be developed and funded.

Cumulative Impacts

The establishment of sewer service would allow the Mason County Comprehensive Plan to be more fully implemented, potentially resulting in an increase in new construction and additional short-term impacts to utilities and public services within the Belfair UGA. Residents faced with the cost of financing a new centralized wastewater system may also face additional costs associated with financing of other utilities and/or public services associated with a growing community.

Mitigation Measures

The following measures have been developed to minimize the impacts to public services and utilities.

- Continue to seek a wide range of federal and state funding assistance. Consider development of a local improvement district for long term funding. Implement a financial assistance program for low-income residents, to help defray the cost of providing wastewater service.
- Provide public notification of proposed construction activities, including the timing of construction, to all local service providers and schools within the immediate vicinity of the reclamation plant, pump station(s) and pipeline locations.
- Plan construction traffic routing to maintain free-flowing traffic conditions and minimize potential increases in response times for emergency vehicles. Develop construction traffic plans in accordance with Mason County requirements to ensure emergency service providers identify emergency access routes that are to be maintained during construction activities.
- Prior to construction, prepare an Emergency Response Plan addressing construction and operation safety issues and response procedures to emergencies.
- Ensure that contractors provide safety personnel at construction sites in accordance with the Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) requirements. In case of an emergency at a construction site, the contractor would be the first to respond, with local fire and emergency service agencies providing backup support if required.
- Prepare a Hazardous Materials Spill Prevention Plan in accordance with federal, state, and local regulations. The plan would outline specific procedures that construction and emergency service providers would follow in the event of an accidental spill of chemicals.
- Coordinate with local utility service providers to assist in utility locations and to identify specific mitigation measures to minimize impacts to utility purveyors.
- Mason County is in the process of developing a plan regarding development and management of on-site sewage systems, consistent with WAC 246-272A. This plan will include an inventory of existing onsite systems and a proposed long term monitoring plan, as well as a public education plan. If the No Action Alternative is implemented, this plan would be applicable within the Belfair UGA and the North Shore LAMIRD.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to public services and utilities are anticipated from the construction of Alternatives 1 or 2, or associated with Alternative 3. Financial impacts to selected individuals may be considered to be significant on a case-by-case basis, however, potentially significant impacts are associated with the No Action Alternative as well as Alternatives 1 or 2.

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